Sect H

U. S. Government RESEARCH REPORTS

October 16, 1959
Vol. 32, No. 4

OF MICHIGAN
OCT 30 1959
ENGINEERING

. . . A monthly listing of Government research reports available to industry . . .

this issue:

Observations on the Effect of Surface and Structure on the Tensile Strength of Iron Whiskers

Electron Physics of Traveling Wave Tube Devices

Measuring Accuracy in Creep Tests

Perarylated Silanes

Research on Liquid Metals as Power Transmission Fluids

Research on Techniques for the Production of Ultra-Pure Beryllium

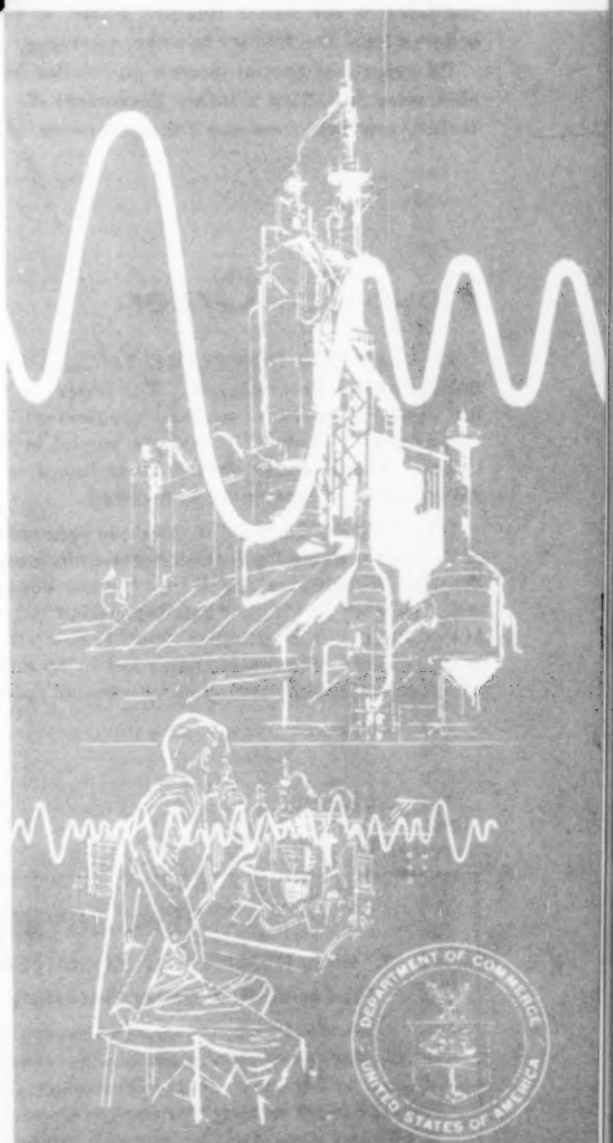
Efficiency of a Thermomagnetic Generator

Recent Developments in Inelasticity

Materials in Space Environment

Some Probability Aspects of the Aircraft Collision Problem

Complete list of printed reports begins on page 417



U. S. DEPARTMENT OF COMMERCE
Office of Technical Services

The PB Reports . . .

announced in this publication have just been released, usually by agencies of the U. S. Government, for dissemination to the public. In most instances they result from Government or Government-sponsored research.

The Office of Technical Services is responsible, under Public Law 776, 81st Congress, for the collection and distribution of these technical reports in the interest of American science and industry.

The more important reports are reprinted for sale to the public by OTS. Many of the reports are so specialized that the demand for them does not warrant reproduction of printed copies; originals of these documents are deposited at the Library of Congress. There they may be inspected in the Annex Reading Room, or copies may be ordered from the Library in either photocopy or microfilm.

PB reports of special interest to smaller businesses are abstracted in OTS's monthly *Technical Reports Newsletter*, available from the Superintendent of Documents, Washington 25, D. C., at $1 a year domestic, $1.50 foreign.

Since 1945 thousands of business firms have used PB reports in their research programs. These reports now constitute one of the world's largest collections of non-confidential technical information, numbering over 250,000 items. OTS has published catalogs of related reports in more than 300 areas of industrial interest. For further information relative to any of its activities, you are invited to write OTS, U. S. Department of Commerce, Washington 25, D. C.

Except to the extent indicated by acknowledgment of authorship, OTS does not edit PB reports, nor does it accept responsibility for the information and conclusions contained in them. If copyrighted material appears, permission for its use should be requested from the copyright owners. Any national security restrictions that may have applied to these reports have been removed. Patents may cover the subject matter of any report, and the reader is advised to make patent searches before developing applications based on the reports.

How To Order

ALWAYS USE COMPLETE TITLE AND PB NUMBER of each report ordered. The letter "s" accompanying some PB numbers means "supplement," "t" means "translation," and "r" means a partial or complete revision. These letters should be included as part of the PB number. Prepayment is required.

TO ORDER FROM LC • Address your order to Library of Congress, Photoduplication Service, Publications Board Project, Washington 25, D. C. Make check or money order payable to Chief, Photoduplication Service, Library of Congress. State whether report is desired in microfilm or photocopy. Microfilm copies are in 35 millimeter film and require special reading equipment; if you do not have such a machine you may be able to use one at a library in your area.

TO ORDER FROM OTS • Address your order to Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Make check or money order payable to OTS, Department of Commerce. Reports available from OTS may also be ordered through Department of Commerce field offices.

TO ORDER FROM OTHER SOURCES • When an agency other than OTS or LC is the source, use the full address included in the abstract of the report. Make check or money order payable to that agency.

U. S. GOVERNMENT RESEARCH REPORTS

U. S. DEPARTMENT OF COMMERCE
Frederick H. Mueller, Secretary

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

Issued monthly. Annual subscription $6 ($3 additional for foreign mailing). Single copy 60 cents. In the U. S. make remittance payable to Superintendent of Documents and mail either to a Department of Commerce field office or to Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Address changes should be sent to Superintendent of Documents. Outside the U. S. make remittance payable to and order from OTS, U. S. Department of Commerce, Washington 25, D. C. Foreign address changes should be sent to OTS.

Contents are not copyrighted and may be reprinted freely. Mention of source will be appreciated.

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, July 18, 1958.

CONTENTS

	Page
BIBLIOGRAPHY	421
AGRICULTURE	421
ASTRONOMY	421
Astrophysics	421
BEHAVIORAL SCIENCES	422
Human Engineering	422
Personnel and Training	423
Psychology --Space Perception	426
BIOLOGICAL SCIENCES	429
Anatomy and Physiology	430
Pathology	433
Surgery	434
CHEMISTRY	434
Analytical Chemistry	434
Inorganic Chemistry	436
Organic Chemistry	436
Physical Chemistry	438
EARTH SCIENCES	442
Climatology and Meteorology	442
Geodesy	446
Physics of the Atmosphere	447
ENGINEERING	448
Aeronautical Engineering	449
Chemical Engineering	452
Civil Engineering	453
Electrical and Electronic Engineering	454
Ordnance, Missiles, and Satellite Vehicles	469
FOOD, HANDLING, AND PACKAGING EQUIPMENT	470
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	471
Engines and Propulsion Systems	471
Manufacturing Equipment and Processes	473
Transport, Traction and Hoist Facilities	474
MATERIALS	474
Ceramics and Refractories	475
Fuels, Lubricants, and Hydraulic Fluids	475
Leather and Textiles	477
Paints and Finishes	477
Plastics	477
Rubber and Elastomers	478
MATHEMATICS	479
Computing Devices	486
MECHANICS	487
Aerodynamics and Pneumatics	488
Statics, Kinematics, and Kinetics	495
METALLURGY	497
Ferrous Metals	497
Light Metals	498
Nonferrous (except light) Metals	499
Structural Metallurgy and Corrosion	499
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	501
Elementary Particles	501
Instruments and Installations	503
Nuclear Engineering and Power	503
Radioactivity	504
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	504
PHYSICS	505
Electricity and Magnetism	505
Electronics	506
Molecular Physics and Spectroscopy	507

Page

PHYSICS (con.)
Optics ... 508
Solid State Physics ... 509
Theoretical Physics ... 513
Thermodynamics ... 514
Wave Propagation ... 516
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT ... 520
Photographic Equipment ... 520
SOCIAL SCIENCES ... 521
Documentation ... 521
MISCELLANEOUS ... 522
ATOMIC ENERGY COMMISSION REPORTS ... 523
GENERAL ... 523
BIOLOGY AND MEDICINE ... 523
CHEMISTRY ... 524
General ... 524
Radiation and Radiochemistry ... 526
Separation Processes for Plutonium and Uranium ... 527
CONTROLLED THERMONUCLEAR PROCESSES ... 528
CRITICALITY STUDIES ... 530
GEOLOGY AND MINERALOGY ... 530
HEALTH AND SAFETY ... 530
INSTRUMENTS ... 537
METALLURGY AND CERAMICS ... 539
PARTICLE ACCELERATORS AND HIGH-VOLTAGE MACHINES ... 542
PHYSICS AND MATHEMATICS ... 543
PROGRESS REPORTS ... 547
RADIATION EFFECTS ON MATERIALS ... 547
RADIOACTIVE WASTE ... 548
REACTORS ... 549
General ... 549
Power ... 551
STABLE ISOTOPE SEPARATION ... 556
TECHNOLOGY ... 556
Feed Materials ... 556
Raw Materials ... 557
SOURCE INDEX ... I-1
SUBJECT INDEX ... I-13
NUMBER INDEX ... I-31

Printed Reports Available from OTS Announced in This Issue

Page

ASTRONOMY

Comments on the ephemerides and constants for a solar eclipse (with an eclipse bibliography appended) May 59. 73p. (PB 151 899) $2.00 422
Daytime detection of celestial bodies using the intensifier image orthicon. Oct 58. 45p. (PB 151 866) $1.25 421

BEHAVIORAL SCIENCES

Attention value of audio and visual warning signals. Apr 59. 87p. (PB 151 908) $2.25 426
Division of responsibility between two controllers and load balancing flexibility in a radar approach control team: A study in human engineering aspects of radar air traffic control. Apr 59. 20p. (PB 151 879) 50 cents 422
Feasibility study for a man-machine systems research facility. Mar 59. 258p. (PB 151 889) $4.00 422
Psychological variables in the design of flight simulators for training. Jan 59. 140p. (PB 151 859) $2.75 425
Research to investigate factors affecting multiple-task psychomotor performance. Mar 59. 46p. (PB 151 891) $1.25 429

BIOLOGICAL SCIENCES

Cutaneous toxicity evaluation of Air Force development materials, III. June 59. 11p. (PB 151 910) 50 cents 433
Effect of body posture on maximal inspiratory and expiratory stroke volume. Mar 59. 13p. (PB 151 892) 50 cents 431
Influence of staphyloccal enterotoxin on performance in guinea pigs. Mar 59. 12p. (PB 151 864) 50 cents 429
Short duration harmonic analysis of EEG data. Feb 59. 16p. (PB 151 868) 50 cents 433
Simple clinical test for boron hydride exposure. Apr 59. 16p. (PB 151 869) 50 cents 432
System for monitoring the electrocardiogram during body movement. Apr 59. 50p. (PB 151 906) $1.25 433
Vision in military aviation. Nov 58. 394p. (PB 151 653) $5.00 431

CHEMISTRY

Electronic band structure of solids by the method of experimental x-ray spectroscopy. July 57 rev. June 58. 109p. (PB 151 453) $2.50 435
Perarylated silanes: A class of stable organic molecule. Jan 59. 22p. (PB 151 860) 75 cents 436
Radiation induced reactions of olefins. Jan 59. 28p. (PB 151 857) 75 cents 438
Wetting of low-energy solids by aqueous solutions of highly fluorinated acids and salts. June 59. 16p. (PB 151 696) 50 cents 440

EARTH SCIENCES

Processes for the production and removal of electrons and negative ions in gases. June 59. 24p. (PB 151 930) 75 cents 448
Snow hydrology. Summary rept. of the Snow Investigations. June 56. 621p. (PB 151 660) $8.00 443
Tables of median hourly values of the cosine of the solar zenith angle (χ) for thirty-five locations. Feb 59. 39p. (PB 151 365) $1.25 446

Page

ENGINEERING

Airfield pavement. Jan 53. 103p. (PB 151 617) $2.50 451
An experimental microwave reentrant beam tube. Apr 59. 95p. (PB 151 886) $2.25 457
Apparatus for measurement of the magnetic threshold curves for superconductors. Mar 59. 19p. (PB 151 877) 50 cents 466
Analytical representations of thick magnetron beams. Apr 59. 24p. (PB 151 887) 75 cents 457
Basic structural engineering. May 54. 132p. (PB 151 615) $2.75 454
Bibliographical review of panel flutter and effects of aerodynamic noise. June 59. 42p. (PB 151 890) $1.25 451
Development of oscillatory rolling-contact bearings for airframe applications in the temperature range 300 F to 600 F. Mar 59. 104p. (PB 151 909) $2.50 451
Effect of combined fire and water on silicone insulated cables. Feb 59. 9p. (PB 151 751) 50 cents 462
Efficiency of a thermomagnetic generator. June 59. 9p. (PB 151 736) 50 cents 465
Electron physics of traveling wave tube devices. Feb 59. 24p. (PB 151 888) 75 cents 457
Heterogeneous construction for missile fuselages. Nov 58. 136p. (PB 151 881) $2.75 470
Insulation study for airframe structures. Apr 58. 151p. (PB 151 618) $2.75 452
Intrusion of aircraft noise into communities near two USAF air bases. Feb 59. 237p. (PB 151 822) $3.50 451
Light-weight seating: design research and development of a net seat for project manhigh: one of a series of studies pertaining to crew compartment habitability for extended missions. Dec 58. 50p. (PB 151 787) $1.25 452
Materials in space environment. Proceedings of the Sagamore ordnance materials research conference (no. 5) conducted at Sagamore Conference Center, Racquette Lake, New York. Sep 58. 276p. (PB 151 900) $4.00 449
New method for determining the degree of compatibility of dry chemical powders with mechanical foams. June 59. 21p. (PB 151 734) 75 cents 453
Some probability aspects of the aircraft collision problem. Apr 59. 46p. (PB 151 556) $1.25 450
Some results from the study of the large-signal behavior of cascade-circuit traveling-wave tubes. Oct 58. 33p. (PB 151 607) $1.00 460
Waterfront and harbor facilities. Sep 54. 128p. (PB 151 614) $2.75 454
Waveguide dummy loads and attenuators utilizing high-gloss ferromagnetic materials. June 59. 27p. (PB 151 637) 75 cents 465

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Development of new sound absorbing materials for noise suppressors. Part I. Development of equipment for evaluating acoustical and durability properties of sound absorbing materials at elevated temperatures. June 59. 74p. (PB 151 907) $2.00 471
Human factors problems affecting merchant ship navigation safety: A preliminary investigation. June 59. 146p. (PB 151 765) $2.75 474
Investigation of solidification of high strength steel castings under simulated production conditions. July 58. 59p. (PB 151 753) $1.50 473

MATERIALS

Development of improved nylon webbings. Apr 59. 74p. (PB 151 861) $2.00 477
Ductile-brittle transition in the refractory metals. June 59. 76p. (PB 151 070) $2.00 475
Research on liquid metals as power transmission fluids. May 59. 196p. (PB 151 876) $3.00 476

Page

MATERIALS (con.)

Storage life of unvulcanized rubber compounds. June 58. 29p. (PB 151 643) 75 cents ... 479
Study of holding strength of resin dipped metal fasteners in woven roving laminate. Feb 59. 6p. (PB 151 752) 50 cents ... 477

MECHANICS

Determination of aircraft stability coefficients from flight test data. Part I. Theoretical considerations. Aug 58. 157p. (PB 151 903) $3.00 ... 492
Determination of aircraft stability coefficients from flight-test data. Part II. Longitudinal investigations. Apr 58. 147p. (PB 151 926) $2.75 ... 492
Determination of aircraft stability coefficients from flight-test data. Part III. Lateral investigations. July 58. 78p. (PB 151 927) $2.00 ... 493
Effect of configurational additions using viscoelastic interfaces on the damping of a cantilever beam. May 59. 67p. (PB 151 883) $1.75 ... 496
Measuring accuracy in creep tests. Part I. Influence of eccentricity of load. July 59. 28p. (PB 151 928) 75 cents ... 496

Random vibration of elastic strings: Theoretical. May 59. (PB 151 885) 75 cents ... 487
Recent developments in inelasticity. Nov 58. 59p. (PB 151 823) $1.50 ... 487
Response of bars (with internal and boundary damping) to transient and random excitation. May 59. 32p. (PB 151 884) $1.00 ... 496
Shock-wave oscillations in supersonic flow. Dec 57. 68p. (PB 151 902) $1.75 ... 493
Statistical method for the extraction of stability parameters from the flight-test data. Dec 57. 101p. (PB 151 901) $2.50 ... 493
Theoretical and experimental studies of the stresses and strains around cutouts in loaded, unevenly heated plates. Mar 59. 173p. (PB 151 867) $3.00 ... 487

METALLURGY

Aluminum-silicon eutectic. June 59. 12p. (PB 151 735) 50 cents ... 497
Ductile high strength titanium castings by induction melting. Sep 58. 19p. (PB 151 572) 50 cents ... 499
Effect of changing cyclic modulus on bending fatigue strength. May 59. 34p. (PB 151 987) $1.00 ... 499
Fine particle strengthening for high temperature use. Dec 58. 18p. (PB 151 863) 50 cents ... 497
New approach to analyzing the phases of Alnico V. Mar 59. 49p. (PB 151 882) $1.25 ... 499
Research on techniques for the production of ultra-pure beryllium. Feb 59. 45p. (PB 151 878) $1.25 ... 498

MISCELLANEOUS

Report of NRL Progress. Sep 59. (PB 151 342) $1.25, $10.00/year ... 522

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

Calculated behavior of a fast neutron spectrometer based on the total absorption principle. Apr 59. 37p. (PB 151 369) $1.00 ... 501
Double-pulse total-absorption fast neutron spectrometer. Apr 59. 27p. (PB 151 360) 75 cents ... 501
Penetration of gamma rays from isotropic sources through aluminum and concrete. May 59. 14p. (PB 151 370) 50 cents ... 503

Page

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

Anthropometric sizing and fit-test of the MC-1 oral-nasal oxygen mask. Mar 59. 28p. (PB 151 880) 75 cents ... 504
Height-weight sizing system for flight clothing. Apr 59. 116p. (PB 151 858) $2.50 ... 504

PHYSICS

An analysis of propagation measurements made at 418 Mc well beyond the radio horizon. May 59. (PB 151 365) $2.25 ... 518
Determination of surface free energy of metals and polymers. Apr 59. 87p. (PB 151 929) $2.25 ... 510
Effects of nuclear irradiation upon the microwave properties of certain ferrites. June 59. 10p. (PB 151 691) 50 cents ... 507
Isothermal transformation study of the beta phase decomposition in a hypo-eutectoid copper-indium alloy. Feb 59. 65p. (PB 151 865) $1.75 ... 509
Low- and very low-radiofrequency tables of ground wavesparameters for the spherical earth theory: the roots of Riccati's differential equation (supplementary numerical data for NBS Circular 573) Feb 59. 88p. (PB 151 366) $2.25 ... 518
Observations on the effect of surface and structure on the tensile strength of iron whiskers. May 59. 28p. (PB 151 904) 75 cents ... 511
Prediction of the cumulative distribution with time of ground wave and tropospheric wave transmission loss. Part I. The prediction formula. July 59. 81p. (PB 151 374) $1.50 ... 518
Research on the recrystallization of aluminum single crystals. Dec 58. 91p. (PB 151 862) $2.25 ... 510
Technical considerations leading to an optimum allocation of radio frequencies in the band 25 to 60 Mc. June 59. 97p. (PB 151 372) $2.50 ... 519
Thermodynamic properties of helium at low temperatures and high pressures. May 59. 40p. (PB 151 367) $1.25 ... 515
Transient response of double-fluid heat exchangers. Oct 58. 98p. (PB 151 905) $2.25 ... 515
Transmission loss in radio propagation II. June 59. 152p. (PB 151 371) $3.00 ... 519
Vapor pressures of some hydrocarbons in the liquid and solid state at low temperatures. May 59. 19p. (PB 151 363) 75 cents ... 515

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

Light amplifier kinescope recorder with a speed of 10 million ASA units for night photography. Apr 59. 12p. (PB 151 914) 50 cents ... 520

U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

U. S. Government RESEARCH REPORTS

Vol. 32, No. 4 Pp. 417 - 557 October 16, 1959

BIBLIOGRAPHY

Georgetown U. Medical Center, Washington, D. C.
PSYCHOLOGIC IMPACT OF POLAR CLIMATE: SELECTED BIBLIOGRAPHY, by Herbert Zimmer. Rept. on Contract Nonr-1530(06). Sep 58, 31p. 248 refs.
Order from LC mi$3.00, ph$6.30 PB 142 087

AGRICULTURE

Wave Research Lab., U. of California, Berkeley.
GEOLOGIC CAUSES OF STRENGTH IN SOILS, by Parker D. Trask and Roger E. Skjei. Final rept. on Contract DA 04-200-ORD-171. Mar 58, 56p. 108 refs. Series no. 77, issue no. 7.
Order from LC mi$3.60, ph$9.30 PB 142 324

Soils are of two types: (1) clastic or noncohesive soils, composed mainly of clastic particles of sand or silt size, in which strength depends primarily upon friction between grains and is influenced by such factors as load; water content; degree of saturation; density; and roundness, surface texture, size distribution and packing of constituents; and (2) plastic, or cohesive soils, containing some or much plastic material of clay composition, in which strength is influenced by forces between clay particles in the moist state. The principal variables that affect strength of cohesive soils are water content, sand-clay ratio, grain size, clay type, temperature, and time. In the present investigation individual effects of these factors have been studied by shear vane tests of synthetic mixtures of saturated sediments of known composition.

ASTRONOMY

Aeronautical Research Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
DAYTIME DETECTION OF CELESTIAL BODIES USING THE INTENSIFIER IMAGE ORTHICON, by Radames K. H. Gebel. Oct 58, 45p. 5 refs. WADC Technical note 58-324; AD-204 793.
Order from OTS $1.25 PB 151 866

This report presents a theoretical analysis dealing with the limiting magnitude of a celestial body, using the intensifier image orthicon. Some photographs are shown illustrating the potentialities for contrast of this instrument. The theoretical calculations deal first with the fundamental limit set on the detectable magnitude by quantum statistics and then with the limits imposed by characteristics of the intensifier image orthicon in its present state of development. The pictures include daytime photographs of astronomical objects and a full face photograph of the moon showing a large amount of detail that cannot be obtained in such a picture by purely photographic methods.

Astrophysics

Poulter Labs., Stanford Research Inst., Menlo Park, Calif.
IMPACT OF HIGH SPEED PARTICLES WITH SOLIDS AND GASES, by M. C. Kells and D. D. Keough. Final rept. for 2 Apr 56-30 Sep 58 on Contract AF 19(604)1892. 15 Dec 58, 50p. AFCRC TR-59-219; AD-210 935.
Order from LC mi$3.30, phT7.80 PB 142 407

The first successful technique has been developed for providing quantitative measurement of hypervelocity cratering variables using particles of sizes less than about 150 microns. This has been accomplished by perfecting an explosive acceleration system in which deleterious blast effects have been eliminated, particle breakup has been minimized, and in which velocity measurements do not affect the particle significantly.

Preliminary studies were made on the ablation of steel in a nitrogen ion beam, and an apparatus was developed for studying light production when a microparticle impacts a target.

High Altitude Observatory, Boulder, Colo.
SCIENTIFIC REPORT NO. 9, by James W. Warwick and Harold Zirin. Rept. for 1 July-30 Sep 57 on Contract AF 19(604)1491. 10 Jan 58, 17p. 3 refs. AFCRC TN-57-972; AD-133 761.
Order from LC mi$2.40, ph$3.30 PB 142 431

We present results on observations of 18 Mc/s cosmic noise intensity received during the flare of 19 June 1957. In addition, we compare photographs of the flare observed in H-alpha light at Sacramento Peak, New Mexico. We also note the occurrence of a solar outburst at 18 Mc/s during this flare, and compare this low frequency record with higher frequency dynamic spectra observed at Fort Davis, Texas. We also describe results on the analysis of Lyman-alpha flux variations through five other solar flares. We can compare the time of maximum of absorption at 18 Mc/s with the time of maximum intensity of the associated SEA. The delay of the latter can be explained entirely in terms of its lower level of origin. Finally, we include a reprint of a comparison between X-ray, Lyman-alpha, and SCNA observations of the flare of 20 July 1956. (See also PB 133 064)

Air Force Cambridge Research Center, Bedford, Mass.
COMMENTS ON THE EPHEMERIDES AND CONSTANTS FOR A SOLAR ECLIPSE (WITH AN ECLIPSE BIBLIOGRAPHY APPENDED) by Robert C. Cameron, rev. by Edward R. Dyer. May 59, 73p. 334 refs. GRD Research Notes no. 11; AFCRC TN-59-225; AD-215 116.
Order from OTS $2.00 PB 151 899

Corrections to the spheroidal coordinates of a site on the earth's surface or to the geodetic distance between two sites that have been deduced by comparing the observed circumstances of an eclipse with their predicted value are uncertain by an amount that depends on: (1) the uncertainties in the geodetic and astronomical constants, (2) the errors in the ephemerides used in the eclipse calculations, (3) the errors of timing the contacts, and (4) the errors that arise in referring the points of contact to an ideal spherical moon. The effect of these various sources of error on the final result (site coordinates or geodetic distances) is discussed. Ways of minimizing these effects are outlined. The best accuracy in the geodetic distance between two sites that is currently attainable under optimum conditions appears to be about ±70 meters (p. e.), that for absolute site coordinates somewhat worse.

BEHAVIORAL SCIENCES

Human Engineering

Industrial Engineering Lab., New York U., N. Y.
MAXIMUM LIMITS OF WORKING AREAS ON VERTICAL SURFACES, by K. O. William Sandberg and Harold L. Lipschultz. Rept. on Subcontract to Contract N5ori-166(01). Reprint Apr 52, 20p. Rept. no. 166-1-8.
Order from LC $2.40, ph$3.30 PB 142 150

This experiment measured the maximum area which can be reached on a flat vertical surface by the two arms of eight male subjects seated at varying viewing distances away from the surface. The paper discusses the influence of some of the variables: viewing distance, arm length, and body distance between pivot centers.

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
DIVISION OF RESPONSIBILITY BETWEEN TWO CONTROLLERS AND LOAD BALANCING FLEXIBILITY IN A RADAR APPROACH CONTROL TEAM: A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL, by J. S. Kidd and James J. Hooper. Rept. on Contract AF 33(616)3612. Apr 59, 20p. 10 refs. WADC Technical rept. 58-473; AD-214 616.
Order from OTS $0.50 PB 151 879

The general problem of optimum division of duties between two or more men who are performing essentially the same functions in a complex man-machine system was investigated. Six two-man control teams were employed in an experiment which evaluated three methods of control assignment and two procedures for exchange of control assignment in a simulated radar approach control system. Assignment of control on the basis of aircraft destination was found to be superior to assignment by alternation or assignment by sector of entry. There was some evidence that a condition of partial restraint on the exchange option impaired system performance, although the data were not conclusive. An explanation based on the balance of demand on operator capacity across task segments was suggested as one which was compatible with the data.

National Bureau of Standards, Washington, D. C.
FEASIBILITY STUDY FOR A MAN-MACHINE SYSTEMS RESEARCH FACILITY, by Arthur A. Ernst. Rept. on [Contract] AF (33-616)56-10. Mar 59, 258p. WADC Technical rept. 59-51; AD-213 589.
Order from OTS $4.00 PB 151 889

This report concerns an advanced laboratory facility for research on man-machine systems. The study postulates the need for an optimal division of labor among men and machines in complex weapon systems, and is oriented toward the functional rather than the physiological and psychological factors of the human environment. The study also postulates the possibility of employing dynamic simulation of such systems as an appropriate tool for optimization. The study is addressed to the feasibility of implementing and operating a research facility having the necessary simulation capabilities. Feasibility was judged through designing, implementing, and operating a scale model of the desired facility. This process served to delineate the characteristics required of the necessary equipment. The experience thus obtained also enabled the drawing of conclusions as to how well the design objectives might be met and how much the facility and its operation might cost.

Naval Training Device Center, Port Washington, N. Y.
HUMAN FACTORS IN MAINTENANCE. PART IV: FACTORS INFLUENCING THE MAINTENANCE OF ELECTRONIC EQUIPMENT, by John D. Folley, Jr. and James W. Altman. 22 Sep 58, 120p. 11 refs. Technical rept. NAVTRADEVCEN 20-OS-23-4.
Order from LC mi$6.00, ph$18.30 PB 142 074

This part delineates many of the general features and cautions necessary for effective maintenance.

Quartermaster Research and Engineering Center, Natick, Mass.
QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: VI. SIZE LIMITS OF THE HEAD AND NECK AREA OF THE SOLDIER WEARING QUARTERMASTER HEADGEAR, by John L. Kobrick. Mar 59, 87p. Technical rept. EP-107.
Order from LC mi$4.80, ph$13.80 PB 142 311

This report presents human engineering information on the size range of the head and neck area of the soldier wearing Quartermaster headgear. It should be used as a handbook by engineers and designers for establishing space allowances in the design and sizing of man-operated equipment. The criteria used are the points beyond which the largest 5 percent and the smallest 5 percent of head sizes fall; therefore, the data are concerned with the middle 90 percent of the range of head sizes for the Army population. The information is presented in pictorial form with index scales, so that dimensions can be measured on the pictures and referred to the index scales to establish actual size. (See also PB 131 192)

Personnel and Training

School of Aviation Medicine, Randolph [AFB] Tex.
PHYSIOLOGICAL RECOGNITION OF STRAIN IN FLYING PERSONNEL: EOSINOPENIA IN F-86 COMBAT OPERATIONS, by Thaddeus J. Domanski. Sep 53, 27p. 2 refs. Proj. no. 21-1208-0005, rept. no. 2.
Order from LC mi$2.70, ph$4.80 PB 140 981

Recognizable combat stresses encountered by F-86 pilots in Korea are described. Associated eosinophil findings are presented and discussed. Eosinopenia was frequently but not invariably associated with the F-86 combat missions studied. Missions selected on the basis of a relative uniformity of data collection suggest that eosinopenia following a routine combat mission was significantly associated with weak or very weak combat pilots ($P < .01$). The absence of an eosinopenia following a difficult combat mission was limited to superior, average, or better than average combat pilots. The distinction between routine and difficult combat missions is based upon the presence of air-to-air combat. Evaluations of combat performance were made by supervisory flying personnel.

School of Aviation Medicine, Randolph AFB, Tex.
CRITERION DIMENSIONS OF ADAPTABILITY TO PILOT TRAINING, by David K. Trites, Albert L. Kubala, and Bart B. Cobb. Feb 59, 13p. 13 refs. Rept. 59-26.
Order from LC mi$2.40, ph$3.30 PB 142 013

A factor analysis of 22 variables obtained for aviation cadets during pilot training revealed five interpretable factors: Peer Respect, Peer Acceptance, Military Conformity, Academic Achievement, and Flying Achievement. Several of these could be matched with factors extracted in an earlier study, indicating relatively stable behavior dimensions. Hypotheses derived from the construct of adaptability were supported by comparison of factor scores for groups of subjects classified according to training outcome as pass, ability fail, motivational fail, or emotional fail. This was considered evidence for the validity of the construct.

St. Louis U., Mo.
AN EVALUATION OF THE ASSESSMENT OF MARINE CORPS BASIC SCHOOL CANDIDATES AND OFFICER CANDIDATE SCHOOL SELECTEES WITH SHORT PSYCHIATRIC INTERVIEWS AND PSYCHOLOGICAL TESTS, by Walter L. Wilkins, Marilyn K. Rigby and others. Final rept. on Contract N7onr-408(02). [1958] 8p. 23 refs.
Order from LC mi$1.80, ph$1.80 PB 142 353

St. Louis U. [Mo.]
ATTITUDE CHARACTERISTICS OF WOMEN SERVING IN THE NAVY AND MARINE CORPS, by Marilyn K. Rigby, Elizabeth D. Ossorio and Joan W. Lingner. Technical rept. no. 10 on Contract N7onr-408(02). Sep 58, 53p. 5 refs.
Order from LC mi$3.60, ph$9.30 PB 142 396

This report described the development and evaluation of a forced-choice test (Service Women's Opinion Survey) designed to identify preferences hypothesized to be related to attitudes, personality variables and current adjustment status of service women. The SWOS succeeded in discriminating outstanding Women Marine recruits from failing recruits and outstanding Wave recruits from those who did poorly. The SWOS revealed differences among all groups of service women tested. These differences were interpreted by content analysis of the discriminating items and

by examination of the item distributions. In addition, the SWOS contained some items that appear to be measuring an age-experience factor. The present study offered evidence of sufficient reliability and validity of the test to recommend its further refinement and abbreviation in preparation for operational use.

St. Louis U., Mo.
APPLICATION OF SOCIOMETRIC TECHNIQUE TO WOMEN RECRUITS. II. ANALYSIS OF INDIVIDUAL AND GROUP CHARACTERISTICS, by Walter L. Wilkins, Marilyn K. Rigby, and Elizabeth D. Ossorio. Technical rept. no. 9 on Contract N7onr-40802. Apr 58, 25p. 23 refs.
Order from LC mi$2.70, ph$4.80 PB 139 378

Analysis of data from successive recruit training platoons at Parris Island, South Carolina, is reported. The questionnaire used includes two classes of questions. One set of items required judgments concerning adequacy of performance in military situations and the other set, judgments of personal attractiveness of fellow recruits. A detailed analysis of the amount of overlap between adequacy and likeability of outstandingly successful and unsuccessful recruits is reported. The hypotheses developed from this exploratory research are presented. (See also PB 134 463)

Quartermaster [Research and Engineering Center, Natick] Mass.
SURVEY OF BODY SIZE OF ARMY PERSONNEL, MALE AND FEMALE METHODOLOGY, by Francis E. Randall and Melvyn J. Baer. Oct 51, 46p. Environmental Protection Branch rept. no. 122 (Revised).
Order from LC mi$2.75, ph$6.50 PB 80 752r

Descriptions and illustrations of anthropometric measurements collected on 105,062 men at six Army separation centers in 1946 are presented. The anthropometric survey was instutited to gather statistics on bodily dimensions of Army personnel for use in research involving items of Quartermaster clothing and equipment. The data collected in this survey were considered necessary in the establishment of specifications on the physical size of male military personnel in relation to clothing sizing and tariffing, and spatial requirements.

Office of Naval Research, Washington, D. C.
PERSONNEL AND TRAINING BRANCH: BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 2: JULY 1957-JULY 1958. 19p. 112 refs.
Order from LC mi$2.40, ph$3.30 PB 127 420S2

Contents:
Basic traits
Selection problems
Billet classification
Performance criteria
Training and education
Supplements bibliography dated June 56 (PB 127 420) and its supplement.

Office of Naval Research, Washington, D. C.
PERSONNEL AND TRAINING BRANCH: BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. June 56, 49p. 424 refs.
Order from LC mi$3.30, ph$7.80 PB 127 420

Contents:
Isolation and measurement of basic psychological traits
Selection and classification problems
Billet analysis and billet classification research
Performance criteria
Training and education research
Supersedes bibliographies dated Mar 54 (PB 116 382) and Apr 55 (PB 116 382s)

Naval Training Device Center, Port Washington, N. Y.
GREEN LIGHT RATER, by L. C. Twyford, J. G. O'Hara, and A. Goldman. 23 Dec 58, 7p. Technical rept. NAVTRADEVCEN-20-OS-3-1.
Order from LC mi$1.80, ph$1.80 PB 142 029

The Green Light Rater is one of a number of teach-test devices developed by, the Naval Training Device Center. These devices are designed to provide teaching and practice to supplement more formal classroom instruction. In the design two basic considerations are, practicality and psychological validity. The Green Light Rater has few electronic components, operates on a simple mechanical system, and can be mounted either on a bulkhead or a stand.

Naval Personnel Research Field Activity, Washington, D. C.
STUDIES IN CAREER MOTIVATION. II. ADMINISTRATION 1, by Albert S. Glickman and Leonard Learner. Mar 59, 54p. 1 ref. BuPers Technical bulletin 59-3.
Order from LC mi$3.60, ph$9.30 PB 142 135

The present report is concerned with the first administration and covers the purpose, sample, method, analysis, results, and interpretation. The first administration provides information pertaining to the attitudes, opinions, expectations, and career plans of the incoming recruit. This information serves two purposes. First, it indicates how the recruit feels about the Navy as he is about to begin his tour of duty. Second, it provides a base measure against which to compare and evaluate information obtained in later administrations. (See also PB 142 137)

Naval Personnel Research Field Activity, Washington, D. C.
STUDIES IN CAREER MOTIVATION. I. BASIC PLAN, by Albert S. Glickman, Leonard Learner, and Aaron J. Spector. Mar 59, 26p. 23 refs. BuPers Technical bulletin 59-2.
Order from LC mi$2.70, ph$4.80 PB 142 137

This report, the first in a series, deals with the basic purposes, plans and procedures involved in a longitudinal follow-up study of enlisted career motivation which will span a period of four years. It is designed to serve as introduction, background, and basic reference for subsequent reports in this series.

Institute of Personality Assessment and Research, U. of California, Berkeley.
AN ASSESSMENT STUDY OF AIR FORCE OFFICERS; PART I. DESIGN OF THE STUDY AND DESCRIPTION OF THE VARIABLES, by Donald W. MacKinnon, Richard S. Crutchfield and others. Rept. on Contract AF 18(600)8. Apr 58, 159p. 74 refs. WADC TR-58-91(1); AD-151 040.
Order from LC mi$7.50, ph$24.30 PB 142 096

This is the first part of a five-part report covering an extensive psychological assessment of a group of Air Force captains selected from the population of captains within Air Training Command who were eligible for promotion. The 343 captains participating in the field-testing phase of the assessment were given 27 paper-and-pencil tests. From the field-testing sample, 100 officers were assigned, in groups of 10, to a 3-day living-in phase of the assessment. During this period they entered into some 50 assessment procedures, and a staff of psychologists rated each officer on a wide variety of personality variables considered relevant for effectiveness in senior command and staff assignments. As part of the evaluation of the assessment date, effectiveness measures were obtained as criteria from Officer Effectiveness Reports, promotion board ratings, and superiors' ratings. A total of 648 variables were derived from the data collected. This report presents the over-all design of the assessment study and defines each of the 648 variables. Norms are listed in an appendix. The report is considered a basic reference document for use with the other four parts of the Technical Report.

Industrial Coll. of the Armed Forces, Washington, D. C.
THE ROLE OF LABOR IN LABOR-MANAGEMENT RELATIONS, by Jack Barbash (U. of Wisconsin). 5 Dec 57. 24p. Publication no. L58-66; AD-200 077.
Order from LC mi$2.70, ph$4.80 PB 139 566

Human Resources Research Office, George Washington, U., Washington, D. C.
THE EFFECTS OF INCREASING AND DECREASING TRAINING TIME ON PROFICIENCY IN THE CRITICAL ARMOR SKILLS, by Robert A. Baker, Boyd L. Mathers and Eugene G. Roach. Technical rept. 55 on Contract DA 44-109-qm-650. June 59, 41p. 1 ref.
Order from LC mi$3.30, ph$7.80 PB 142 051

This study was conducted primarily to determine how the proficiency of the typical Armor trainees varies, in the most important skill areas, with the amount of instruction time. Secondary purposes were (1) to identify skills not easily mastered with increased practice alone, and (2) to determine the effect of aptitude on learning these skills. Recommendations for developing improved training methods are discussed.

Human Resources Research Office, George Washington U., Washington, D. C.
DEVELOPMENT AND USE OF A PERFORMANCE TEST AS A BASIS FOR COMPARING TECHNICIANS W. L. Williams, Jr. and Paul G. Whitmore, Jr. Technical rept. 52 on [Contract DA 44-109-qm-650] Jan 59, 40p. 5 refs.
Order from LC mi$3.00, ph$6.30 PB 139 666

A performance test was developed which included trouble shooting and adjustment operations on a NIKE AJAX IFC system, and a soldering item. A written test was based on material presented NIKE AJAX technicians during their school training. The tests were administered to three groups of technicians: 91 inexperienced, 18 "package-trained," and 98 field-experienced (average, 19 months).

Courtney and Co., Philadelphia, Pa.
APPLICATION OF A SYSTEMS CONCEPT TO PERSONNEL RESEARCH, by Omer Lucier, Myron A. Fischl, and Douglas Courtney. Rept. no. 22 (Final) on Contract Nonr-2212(00). 1 Aug 58, 114p. 65 refs.
Order from LC mi$6.00, ph$18.30 PB 140 963

The project is devoted to the development of information gathering and information analysis techniques to support and implement the work of other divisions of the Bureau and thus aid in the general objective of providing command with techniques and procedures for increasingly effective personnel decisions. The development of these techniques is based on considering the personnel organization as a system and applying the systems concept to it.

Aviation Psychology Lab., U. of Illinois, Urbana.
PSYCHOLOGICAL VARIABLES IN THE DESIGN OF FLIGHT SIMULATORS FOR TRAINING, by F. A. Muckler, J. E. Nygaard and others. Rept. on Simulation Requirements of Training Equipment, Contract AF 33(616)2725. Jan 59, 140p. 158 refs. WADC Technical rept. 56-369; AD-97 130.
Order from OTS $2.75 PB 151 859

In the design, construction and use of flight simulators and trainers, two problem areas have been contrasted frequently: the degree of fidelity of physical simulation that may be achieved between training device and operational aircraft, and the problem of psychological simulation, i.e., the training value that results from use of a synthetic training device. A survey of many of the problems that have arisen in the context of psychological simulation is included. Existing training research literature on flight trainers and simulators is evaluated; and a number of experimental programs are suggested. Several specific problem areas concerning design and use of flight training devices have continually appeared and these areas have been examined briefly.

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION: DEVELOPMENT AND APPLICATION OF A TCBL CRITERION TO THE SESR PROGRAM FOR JET AVIATION MACHINIST'S MATES, by Milton Richlin, Philip Federman, and Arthur I. Siegel. Rept. on Contract Nonr-2279(00). Aug 58, 105p. 42 refs.
Order from LC mi$5.70, ph$16.80 PB 142 120

The present research had two general purposes: (1) measurement of the effects of the Selected Emergency Service Rate program (SESR) on the quality of the technical performance of jet aviation machinist's mates. (2) development of a criterion instrument ap-

plicable to the on-going measurement of the proficiency level of jet machinist's mates who are graduates of the Naval Air Technical Training Command.

American Inst. for Research, Pittsburgh, Pa.
THE VALIDATION OF PREDICTIONS CONCERNING PERSONNEL AND TRAINING REQUIREMENTS: A CASE STUDY, by Murray Glanzer and Robert Glaser. Rept. on Contract Nonr-2551(00). Aug 58, 42p. 17 refs.
Order from LC mi$3.30, ph$7.80 PB 142 050

In this study the feasibility of predicting these requirements was evaluated. Statements concerning the following areas of skill and knowledge were obtained. (1) Knowledge of operation. (2) Operational maintenance. (3) Trouble shooting. Analysis of the ratings indicates the following: (1) The ratings show acceptable reliability. (2) They indicate that, in general, material developed on the basis of a prototype system remains applicable with minor modification over the five-year period. (3) Material concerning knowledge of operation shows somewhat greater stability than the material on maintenance. The highly specific material in the areas of trouble shooting shows the least stability of the three areas. (4) Material concerning the system itself, i.e., the missile, is more stable than the associated test equipment.

American Inst. for Research, Pittsburgh, Pa.
TRAINING AND TRAINING RESEARCH, by Robert Glaser and Murray Glanzer. Rept. on Contract Nonr-2551(00). Aug 58, 62p. 79 refs.
Order from LC mi$3.90, ph$10.80 PB 142 054

The systematic development of human resources through training requires the following four steps. (1) Specification of training objectives (2) Input control (3) Training procedures (4) Output control. The factors involved in each of the four steps are discussed. Principles drawn from laboratory studies of learning are applied wherever relevant.

Adjutant General's Office, Washington, D. C.
A STUDY OF TWO NON-LINEAR METHODS OF COMBINING PREDICTOR TESTS, by Jack A. Parrish. May 59, 25p. 15 refs. PRB Technical research note 103; AD-213 964.
Order from LC mi$2.70, ph$4.80 PB 142 309

The predictive efficiency of two relatively untried but promising methods of combining test scores were compared with the predictive efficiency of the usual (multiple regression) method. Scores on four ACB tests and two experimental tests were obtained on 1000 enlisted infantrymen on their first tours of duty. The basic problem was to combine the test scores by taking into account special population characteristics in such a way as to maximize prediction of rated combat proficiency. Both experimental methods used test scores for defining the population characteristics. Neither an interaction method (making use of cross-products in the prediction formula) nor a configural method (determining the best prediction for each score pattern) will predict any differences in potential combat proficiency that could not be predicted by traditional methods.

Washington U. [St. Louis, Mo.]
ATTENTION VALUE OF AUDIO AND VISUAL WARNING SIGNALS, by George L. Kreezer. Rept. on Contract AF 33(616)135. Apr 59, 87p. 78 refs. WADC Technical rept. 58-521; AD-213 603.
Order from OTS $2.25 PB 151 908

A comparison was made of the attention-demanding values of auditory stimuli differing in frequency, and of visual stimuli differing in wave length under different conditions of background noise. Following a survey of the literature, a method was developed which was intended to provide a laboratory analogue of real tasks and which lent itself to measurements of stimulus-effectiveness in attracting the attention of the subject. Quantitative measures could now be obtained both by threshold techniques and reaction time techniques. With respect to the practical problem of designing systems of warning signals, the results indicate that engineers and engineering psychologists are justified in utilizing the substantial body of knowledge already established concerning sensory thresholds, and their dependence on frequency, as a guide in the selection of stimuli to be used as warning signals. No statistically significant change in the form of sensory threshold curves results from distraction of the individual by a task.

Rutgers U., New Brunswick, N. J.
HOMEOSTASIS THEORY OF SMALL GROUPS II, by F. K. Berrien and William H. Angoff. Technical rept. 3 on Contract Nonr-404(10). Sep 58, 26p. 1 ref.
Order from LC mi$2.70, ph$4.80 PB 142 092

This report presents three analyses of attitude data based on 32 work groups. The analyses were designed to test hypotheses derived from a homeostasis theory of groups. The central proposition of the theory tested by this investigation is that groups disturbed by an external force, if they respond homeostatically, will adjust the subjective importance of variables related to Group Need Satisfactions or Formal Achievement so as to maintain a stability in these latter respects. The report shows that Group Need Satisfactions were maintained but Formal Achievement were not. The subjective importance of variables appeared to change as the theory demanded although statistical limitations preclude definitive tests at some points.

Rutgers U., New Brunswick, N. J.
A METHOD FOR SELECTING DISCRIMINATING ITEMS, by William H. Angoff and F. K. Berrien. Technical rept. no. 2 on Contract Nonr-404(10). Sep 58, 31p. 1 ref.
Order from LC mi$3.00, ph$6.30 PB 142 339

The report presents a procedure for selecting test items which distinguish between two groups with respect to their patterns of response. The method is applied to data previously reported and analyzed by more conventional methods. The reanalysis shows that some items which could not be evaluated in the earlier study were found to be discriminating by the method herein described. Evidence is also

presented that shows homeostatic adjustments occur among attitudinal items that result in reducing the adverse effects of poor adjustment to work changes.

Psychological Lab., U. of Southern California [Los Angeles].
A FACTOR-ANALYTIC STUDY OF FLEXIBILITY IN THINKING, by J. P. Guilford, J. W. Frick and others. Rept. no. 18 on Studies of Aptitudes of High-Level Personnel, Contract N6onr-23810. Apr 57, 31p. 28 refs. AD-134 449.
Order from LC mi$3.00, ph$6.30 PB 140 962

The nature of 2 types of thinking flexibility and their possible relations to the concept of rigidity and its affiliated concepts were examined. One form of rigidity, perseveration, was hypothesized to be a quality opposite to spontaneous flexibility, and another form of rigidity, persistence, was hypothesized to be a quality opposite to adaptive flexibility. A battery of 28 experimental and reference tests, which yielded 32 score variables, was administered to 208 AF cadets. Twelve factors were extracted from the correlation matrix, and the axes were rotated orthogonally. No factors recognizable as perseveration, persistence, or rigidity were identified. From the results, the revised conception of spontaneous flexibility is that it represents an ability or disposition of freedom from inertia in thinking which makes possible the production of a diversity of ideas. The new conception of adaptive flexibility emphasized restructuring of interpretations and approaches in problem solving and elsewhere. The adaptation of Luchins' water-jar test (E. E. Levitt, Psychol. Bull. 53 no. 5, 1956) had almost no relationship to either flexibility factor.

Office of Naval Research, Washington, D. C.
PHYSIOLOGICAL PSYCHOLOGY BRANCH: BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 4: JULY 1957-JULY 1958. 18p. 144 refs.
Order from LC mi$2.40, ph$3.30 PB 116 303S4

Contents:
Sensory mechanisms
Perception and orientation
Neural basis of behavior
Response mechanisms
Physiological and psychological effects of high intensity noise.
Supplements report dated Mar 54 (PB 116 303) and its supplements

Minnesota U. [Minneapolis].
THE ROLE OF LANGUAGE IN BEHAVIOR, by James J. Jenkins and Wallace A. Russell. Final rept. on Contract N8onr-66216. Aug 58, 9p. 24 refs.
Order from LC mi$1.80, ph$1.80 PB 142 048

The laboratory studies have amply demonstrated the feasibility and usefulness of working with word associations as habits.

Minnesota U., Minneapolis.
A DISPERSION ANALYSIS OF THE INTERESTS OF 115 OCCUPATIONAL AND REFERENCE GROUPS, by Warren T. Norman (U. of Michigan). Technical rept. no. 8 on Contract Nonr-710(17). Sep 58, 43p. 4 refs.
Order from LC mi$3.30, ph$7.80 PB 142 287

In general, therefore, the dispersion analysis model employed yields results which summarize the relations among the groups studied in a sensible and meaningful way. The chief deficiency of the set of homogeneous keys was in their failure to separate the various mechanical and electrical occupations from each other. It was found that about 80 percent of the among-groups variance can be accounted for by the four best linear functions, and the best six out of nine extract almost 92 per cent of the intergroup information. Thus fewer than half the total number of canonical variates are needed to effect a fairly accurate reconstruction of the space.

Minnesota U., Minneapolis.
COMPARATIVE STUDY OF WORD ASSOCIATION NORMS, by James J. Jenkins and Wallace A. Russell. Technical rept. no. 22 on Studies on the Role of Language in Behavior, Contract N8onr-662(16). Aug 58, 21p. 21 refs.
Order from LC mi$2.70, ph$4.80 PB 140 985

This paper presents first the comparison between the early and later Minnesota norms and then goes on to report the major findings of the comparison of these two sets of norms with the O'Connor norms and the Kent-Rosanoff norms, with some incidental comparisons with other norm groups as appropriate. The purpose of the study is to attempt to make clear both the magnitude and the nature of the changes revealed by the comparisons of word association norms and to argue that these changes reveal a systematic and important trend in responding to free association tests which deserves further careful consideration by students of verbal behavior, language and culture.

Michigan U., Ann Arbor.
PSYCHOLOGICAL STRUCTURE AND PSYCHOLOGICAL ACTIVITY, by Helen Peak. Rept. on Contract Nonr-1224(10). 15 Aug 58, 37p. 39 refs.
Order from LC mi$3.00, ph$6.30 PB 140 967

The properties of structure are described and certain basic principles about the relation of structure and activation are proposed. These are discussed as they apply to phenomena such as context effects, assimilation and contrast, the algebraic summation of positive and negative attitudes to produce intermediate attitudes, judgment within "balanced" and "unbalanced" structures as described by Heider and the persisting activity of the motivated state.

Michigan U., Ann Arbor.
GENERALIZATION OF ATTITUDE CHANGE WITHIN A SERIAL STRUCTURE, by Helen Peak, R. P. Quinn, and H. William Morrison. Technical rept. no. 6 on Contract Nonr-1224(10). 1 Sep 58, 81p. 10 refs.
Order from LC mi$4.80, ph$13.80 PB 142 088

The serial structure is a condition within which the generalization of various responses has already been studied, so that an investigation of the generalization of affect within the structure makes possible comparisons with those earlier studies and the theories which they have suggested. Although those studies give no clear guidance because of the conflict in results, they do provide important leads which appear to be highly relevant to the problems of this experimental program.

Lyons U. (France).
NEUROPHYSIOLOGICAL MECHANISMS OF LEARNING, by Michel Jouvet. Final technical rept. on Contract AF 61(514)1206. June 59, 37p. 50 refs. AFOSR TR-59-77.
Order from LC mi$3.00, ph$6.30 PB 142 308

Results obtained on 50 chronic cats show that habituation of the arousal reaction cannot be explained by a functional deafferentation of the activating reticular system. The main problem to investigate was the process of falling asleep. It was found that during physiological sleep, slow waves are recorded from cortex, diencephalon and mesencephalon, in normal cats subtotally decorticated cats, or cats with subtotal section of the brain stem. On the contrary, there is no slow wave during sleep in the diencephalon or the mesencephalon of totally decorticated cats and no slow waves in the mesencephalon in mesencephalic cats. These cats cannot get habituation of the arousal. These results show that a diffuse inhibitory system in which the cortex plays a foremost role acts upon the reticular formation during physiological sleep in normal cats. Thus habituation of the arousal reaction necessitate the integrity of, at least, some area of the cortex. Mechanism of habituation must be explained by a complex interaction between the ascending reticular system and a descending diffuse cortical inhibitory system.

Louisiana State U., Baton Rouge.
SOME EFFECTS OF POWER, PRACTICE AND PROBLEM DIFFICULTY ON SUCCESS AS A LEADER, by Bernard M. Bass and Austin W. Flint. Technical rept. 18 on Behavior in Groups, Contract N7onr-35609. Apr 58, 26p. 10 refs.
Order from LC mi$2.70, ph$4.80 PB 139 379

This analysis examines the effect of motivation, control, group experience and problem difficulty on objective and subjective measures of successful leadership.

Laboratory of Social Relations, Harvard U. Cambridge, Mass.
SEX DIFFERENCES IN INFERRING PERSONALITY TRAITS, by David Shapiro and Renato Tagiuri. Rept. on Contract N5ori-07670. [1958] 14p. 2 refs.
Order from LC mi$2.40, ph$3.30 PB 142 240

We have compared the inferences men and women make about a person's traits on the basis of a given single trait (INTELLIGENT, or CONSIDERATE, or INDEPENDENT, or INCONSIDERATE). Men and women are very similar in the traits they infer from a given trait. While the sex difference in this respect is slight, it is consistent over several independent groups of men and women, and for four different given traits.

Laboratory of Social Relations, Harvard U., Cambridge.
FINAL REPORT. Rept. on Contract N5ori-07646. Aug 58, 21p. 28 refs.
Order from LC mi$2.70, ph$4.80 PB 142 049

The research has focussed on the processes involved in how people perceive and judge each other in social settings. In general, there were three aims. First, to gain a general perspective on research in this field by an analytic review of the literature. Second, to study intensively the perception of interpersonal feelings among interacting members of small groups. Third, to establish a link between work in interpersonal perception and the more general fields of perception and cognition.

Institute of Child Welfare, U. of Minnesota.
PRESERVICE PERSONALITY PROBLEMS AND SUBSEQUENT ADJUSTMENTS TO MILITARY SERVICE: A REPLICATION OF "THE PREDICTION OF PSYCHONEUROTIC REACTIONS", by Merrill Roff. Feb 59, 8p. 2 refs. AFSAM Rept. 58-151.
Order from LC mi$1.80, ph$1.80 PB 142 220

This report replicates and confirms a previous study of individuals who had been guidance clinic patients during childhood or adolescence which had indicated that a history of earlier peer-group difficulties tends to identify subsequent neurotic deviates in military service. It extends the previous study by a further analysis of the relationship between psychiatric comments during preservice clinic treatment and subsequent outcome in service. (See also PB 135 492)

Connecticut U., Storrs.
ROLE OF PARTIAL RESPONSE IDENTITIES IN THE RESTRICTED ASSOCIATION OF NONSENSE SYLLABLES, by W. A. Bousfield, J. J. Danick and G. A. Whitmarsh. Technical rept. no. 29 on Contract Nonr-631(00). Sep 58, 5p. 2 refs.
Order from LC mi$1.80, ph$1.80 PB 142 090

This paper reports the results of a preliminary experiment permitting the testing of two hypotheses derived from the theory of partial response identities as outlined by Bousfield, Whitmarsh, and Danick and used by them to account for verbal generalization. The theory indicates how these partial response identities for pairs of words may be used as a basis for predicting the tendency for generalization to occur. The study was designed with the purpose of applying this theory on the basis of using nonsense materials rather than meaningful words, and applying it to the process of restricted association rather than stimulus generalization. The design was such as to permit a limited test of the following two hypotheses: (a) The extent to which a given nonsense syllable A will elicit nonsense syllable B as an associate should vary positively with the number of letter identities to be found in the nonsense items previously connected with A and with B by the paired associates learning. (b)

The tendency for a given nonsense syllable A to elicit an already learned nonsense syllable B as an associate will be greater when A and B contain identical letters than when they do not.

Connecticut Coll., New London.
MOTIVATION AND PSYCHOLOGICAL STRESS, by Mortimer H. Applezweig and George Moeller. Final rept. on Motivation Research Project, Contract Nonr-996(02). Sep 58, 20p. 26 refs.
Order from LC mi$2.40, ph$3.30 PB 142 242

Psychological stress was defined as a condition produced by a conflict of motives. From this definition, and the concept current in modern notions of motivation, a measure of motivational tendencies, The Behavior Interpretation Inventory (BII), was developed. Following the brief summary of the work accomplished, some suggestions are offered of ways in which such continued research can be implemented. (See also PB 124 288)

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
RESEARCH TO INVESTIGATE FACTORS AFFECTING MULTIPLE-TASK PSYCHOMOTOR PERFORMANCE, by Oscar S. Adams, Raphael B. Levine (Lockheed Aircraft Corp.) and W. Dean Chiles. Rept. on Human Performance in Space Flight, Contract AF 33(616) 6050. Mar 59, 46p. 25 refs. WADC Technical rept. 59-120; AD-213 592.
Order from OTS $1.25 PB 151 891

This study showed the performance tests used to have moderately high reliability and sensitivity to work load but a negligible amount of intercorrelation. While no significant correlation was obtained between performance scores and measures of psychophysiological activity, several of the psychophysiological measures showed significant reliability, intercorrelation, and sensitivity to conditions of rest and performance activity.

Adjutant General's Office, Washington, D. C.
SIMPLIFIED REGRESSION PATTERNS FOR PERSONNEL CLASSIFICATION, by Hubert E. Brogden. Mar 59, 8p. 4 refs. PRB Technical research note 102; AD-210 002.
Order from LC mi$1.80, ph$1.80 PB 142 077

A procedure which permits considerable simplification of regression equations basic to differential prediction or classification is explained and its legitimacy is demonstrated. The procedure in question permits the subtraction of any constant from the regression weights of each test (across all jobs). The constants may be selected to produce a large number of near zero weights, and thus reduce the number of variables entering into each equation. The procedure may also be of value in identifying and rejecting variables having little value for classification or differential prediction.

Adjutant General's Office, Washington, D. C.
MEASUREMENT AND PREDICTION OF FOREIGN LANGUAGE SPEAKING ABILITY, by Rudolph G. Berkhouse, Irving A. Woods and Jack J. Sternberg. 19p. 1 ref. PRB Technical research rept. 1115; AD-212 260.
Order from LC mi$2.40, ph$3.30 PB 142 076

The Army Language Proficiency tests are paper and pencil tests measuring reading comprehension, aural comprehension, and writing in 35 different foreign languages. Most speaking ability screening requirements can be satisfied by using paper and pencil tests of linguistic ability which were found in the present study to relate fairly highly to scores reflecting level of performance in trial interpreter runs. Where an advanced level of foreign language speaking ability is actually required for a job, two stages of screening are recommended: use of "Understanding" items of the appropriate ALP tests as a preliminary screen; final selection by means of the Army Foreign Language Speaking Test, recently recommended to user agencies within the Department of the Army for this purpose.

BIOLOGICAL SCIENCES

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
INFLUENCE OF STAPHYLOCOCCAL ENTEROTOXIN ON PERFORMANCE IN GUINEA PIGS, by William F. Hill. Rept. on Health Hazards of Materials and Radiation. Mar 59, 12p. 4 refs. WADC Technical rept. 59-47; AD-212 317.
Order from OTS $0.50 PB 151 864

This investigation was undertaken to explore the possibility of staphylococcal enterotoxin exerting a toxicity capable of influencing the performance in guinea pigs. Only predetermined "cat positive" enterotoxin filtrates were used. Test animals, inoculated intraperitoneally with 2.0 ml. of the enterotoxin filtrate, were subjected to performance stress after a holding period. Control animals were handled in precisely the same manner as test animals except that equal volumes of physiological saline were used as the inoculum. No dramatic manifestation of enterotoxicity was observed under the conditions of this investigation. A statistical analysis of the data collected indicated no significant difference between the mean performance times of test and control animals. However, a statistical difference at the .05 probability level was obtained for the mean performance of guinea pigs at different water bath temperatures. Inoculation of guinea pigs with "cat positive" enterotoxin filtrate does not influence performance ability.

Colorado State U., Fort Collins.
USE OF METABOLITES IN THE REACTIVATION OF ULTRAVIOLET INACTIVATED MICROORGANISMS, by J. J. Lehman and A. R. Patton. Summary technical rept. for 1 Feb 54-31 Jan 58 on Contract N9onr-824(04). 25 Mar 58, 4p. 7 refs.
Order from LC mi$1.80, ph$1.80 PB 139 375

School of Aviation Medicine, Randolph AFB, Tex.
PHYSIOLOGICAL EFFECTS OF INJECTING HIGH CONCENTRATIONS OF CARBON MONOXIDE INTO THE PERITONEAL CAVITY OF MAMMALS, by Syrrell S. Wilks. Nov 53, 8p. 5 refs. Proj. no. 21-1201-0013, rept. no. 3.
Order from LC mi$1.80, ph$1.80 PB 140 976

Animals can tolerate intraperitoneal injection of large quantities of pure CO without apparent ill effects. Five minutes after injection of CO into the peritoneal cavity, it can be detected in the alveolar air. Following the injection, there is an immediate rise of oxygen pressure in the cavity. The oxygen pressure attains a higher value in animals subjected to hypoxic stresses than in normal animals. The disappearance of curves of CO in normal animals and acclimatized animals are not significantly different. The injection of CO into natural or artificial cavities offers an excellent tool in studying conditions of gaseous equilibria. It is also a simple, convenient method for acclimatizing animals to carbon monoxide.

School of Aviation Medicine, Randolph AFB, Tex.
THE INCIDENCE OF HYPOGLYCEMIA IN FLIGHT, by Ellis R. Taylor. Feb 59, 14p. 8 refs. Rept. 59-8.
Order from LC mi$2.40, ph$3.30 PB 142 061

Observation of 193 subjects, pre- and postflight, failed to reveal any clinical cases of relative hypoglycemia. There were 13 cases in which there was an in-flight drop in blood glucose of over 60 mg. percent; this was found to be correlated with a high carbohydrate-low protein breakfast. Incidental findings demonstrated that the poor social hygiene of many of the pilots studied included not only poor dietary habits but also insufficient sleep and the consumption of alcohol the night before flight. A description of the microtitration method used is included. Standardization data are also appended.

School of Aviation Medicine, Randolph AFB, Tex.
EXPERIMENTS DURING WEIGHTLESSNESS: A STUDY OF THE OCULO-AGRAVIC ILLUSION, by Siegfried J. Gerathewohl and Herbert D. Stallings, Jr. July 58, 22p. 21 refs. Rept. 58-105.
Order from LC mi$2.70, ph$4.80 PB 140 971

To investigate visual illusions during flight, an F-94C type aircraft was flown through various maneuvers. They included turns, pushovers, pullouts, and aileron rolls producing accelerations of different directions and magnitude, as well as short periods of weightlessness. The observer induced a strong visual afterimage and described its apparent motion. Increase of acceleration was found to be associated with an apparent downward movement, and weightlessness with an apparent upward movement of the visual afterimage. This latter phenomenon was called the oculo-agravic illusion.

School of Aviation Medicine, Randolph AFB, Tex.
CELLULAR ADAPTATION DURING EXPOSURE TO HYPOXIA, by Dominic Criscuolo, Robert T. Clark, Jr. and Roy B. Mefferd (Southwest Foundation for Research and Education). Feb 54, 16p. 17 refs. Proj. no. 21-1201-0013, rept. no. 5.
Order from LC mi$2.40, ph$3.30 PB 140 977

An attempt was made to determine the response of oxygen transport, storage, and utilization in the rat to reduced barometric pressure and reduced hemoglobin concentration. Such studies were carried out in rats receiving a low quantity of dietary iron supplement at ground level and at a simulated altitude of 20,000 feet, and were compared to like groups receiving a high dietary iron supplement.

Quartermaster Research and Engineering Center, Natick, Mass.
DIETARY POTASSIUM SUPPLEMENTATION AND PERFORMANCE IN THE DESERT, by H. J. Fregly and P. F. Iampietro. Apr 59, 21p. 15 refs. Technical rept. EP-109.
Order from LC mi$2.70, ph$4.80 PB 142 310

The effect of dietary K supplementation on performance has been studied in a desert environment. Performance ability was assessed by measurement of heart rates after a 4.5 mile hike in 2 hours; scores on the Harvard Step Test; electrocardiograms and morning rectal temperatures. The data presented here indicate that performance may be carried out normally with a total potassium intake of 70 to 75 mEq./day despite large sweat losses. Dietary supplementation to nearly twice this value did not influence performance. Approximatley 90% of the potassium supplement was excreted in the urine. The sequence of physiological in the hot environment was: (a) decrease in diastolic and systolic blood pressure and morning rectal temperature (within 4 days) and (b) decrease in hematocrit ratio and plasma specific gravity (within 2 weeks). This sequence of events suggests that the hemodilution which occurs upon exposure to heat may result from a decrease in mean blood pressure and consequently a shift in body fluids. The decrease in morning rectal temperature accompanying long-term exposure to a hot environment may serve to protect the individual by increasing the amount of heat which he can absorb before high body temperatures are reached.

Psychology Lab., Illinois Inst. of Tech., Chicago.
POLYMERIZATION OF VITREOUS HUMOR SUBSTRATE IN LIGHT AND DARK ADAPTATION, by P. S. Shurrager. Final rept. on Contract AF 18(600)578. Dec 58, 187p. 8 refs. AFOSR TR-58-161; AD-207 460.
Order from LC mi$8.40, ph$28.80 PB 142 101

This report contains data and conclusions from several phases of a six-year fundamental research project. Discussed are new physical and chemical properties of vitreous humor during light and dark adaptation and the changes that occur in vitreous throughout light and dark adaptation, as they are observed under a wide variety of laboratory

techniques. Psychophysical studies of human threshold sensitivity are presented and discussed as to their relationship to physical and chemical processes of vitreous, and unique methods for obtaining visual psychophysical threshold data and for presenting them in terms of known quantal and energy contents are given. Interrelationships among ERG components are analyzed, and new techniques for analysis of EEG and other cyclic phenomena are described. Suggestions are made for practical applications of the research to aviation and military operations.

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
ACCURACY OF MEASUREMENT OF GASEOUS NITROGEN ELIMINATION USING THE CLOSED CIRCUIT-NITROGEN METER METHOD AT ALTITUDES OF 5000 AND 14,200 FEET, by Nils P. V. Lundgren, Elizabeth H. Roorbach and Walter M. Boothby. Rept. on Contract AF 33(038)13244. Nov 53, 11p. 17 refs. AFSAM Proj. no. 21-1201-0007, rept. no. 1.
Order from LC mi$2.40, ph$3.30 PB 140 979

Two series of experiments were made on each of four subjects, one series at an elevation of 5,000 feet and the other series at an elevation of 14,200 feet. The experimental data obtained at the two altitudes demonstrate that in the same individual under comparable conditions the rate and amount of nitrogen eliminated, within the limits of experimental error, are the same at both altitudes when expressed at body temperature, dry and proportional to the barometric pressure when expressed at standard temperature and pressure, dry. The method of collecting the accumulated gaseous pulmonary and tissue nitrogen elimination, with the subject breathing oxygen, in a closed circuit recording gasometer system and analyzing its concentration by a properly calibrated Lilly-Anderson type of nitrogen meter is an accurate and valuable technic for the Air Force to use in evaluating methods for the prevention of decompression sickness in aviators.

Laboratory of Physiological Hygiene, U. of Minnesota, Minneapolis.
SIMULTANEOUS DIRECT AND INDIRECT BLOOD PRESSURE MEASUREMENTS IN MAN AT REST AND WORK, by Austin Henschel, Frederick de la Vega, and Henry Longstreet Taylor. Rept. on Contract AF 33(038)21914. May 54, 6p. 5 refs. AFSAM Proj. no. 21-32-004, rept. no. 7.
Order from LC mi$1.80, ph$1.80 PB 140 978

Comparisons of the blood pressure by the sphygmomanometric and intraarterial (electromanometer) methods in eleven men were made at rest in the supine and standing positions and during several grades of work (walking on a motor-driven treadmill) and for 3 minutes of recovery. During standing and work the systolic pressure was underestimated by the indirect method by mean values of 8 to 15 mm. Hg. During the first 3 minutes of recovery, this method overestimated the systolic blood pressure by mean values of 16 to 38 mm. Hg. During the hardest work level, walking at 3.5 m.p.h. on a 10 percent grade and during the first minute of recovery, a number of subjects were found in whom reasonable values for diastolic pressure could not be determined by the indirect method.

Institute for Applied Experimental Psychology, Tufts U., Medford, Mass.
VISION IN MILITARY AVIATION, by Joseph W. Wulfeck, Alexander Weisz, and Margaret W. Raben. Rept. on Improving Visual Efficiency in Flying, Subcontract to Contract AF 33(616)2906. Nov 58, 394p. 2268 refs. WADC Technical rept. 58-399; AD-207 780.
Order from OTS $5.00 PB 151 653

The requirements of vision in military aviation are analyzed in the light of the human observer. Practical problems of perception encountered in many phases of flying are analyzed and discussed. A comprehensive bibliography is included in each section of the report for those who are interested in a more detailed approach to a particular subject.

Illinois U. Coll. of Medicine, Chicago.
FINAL REPORT, by Archer S. Gordon. Rept. for 1 June 54-1 Jan 59 on Contract DA 18-108-cml-5365. Jan 59, 8p. 13 refs.
Order from LC mi$1.80, ph$1.80 PB 142 319

Duke U. Medical Center, Durham, N. C.
EFFECT OF BODY POSTURE ON MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUME, by F. G. Hall and John Salzano. Rept. on Physiology of Flight, Contract AF 33(616)3821. Mar 59, 13p. 3 refs. WADC Technical rept. 59-128; AD-212 319.
Order from OTS $0.50 PB 151 892

Timed maximal expiratory and inspiratory stroke volumes have been measured in 18 normal young men ranging in age from 19 to 30 years. During these tests, subjects were placed in four postures: standing, supine, head up and body axis at 45 degrees from horizontal, and head down and body axis at 45 degrees from horizontal. The percentage of maximal stroke volume recorded in each case was at rates unrelated to body posutre. Flow rates were nearly linear during the first one-half second of flow. A method for measurement of both inspiratory and expiratory stroke volumes is described.

[Copenhagen U. (Denmark)]
STUDY OF THE ORGANIZATION OF THE VISUAL SYSTEM IN RESPECT TO COLOR, by Margaret A. Lennox. Final technical rept. for 1 Jan-31 Dec 58 on Contract AF 61(514)1194. [1959] 10p. 7 refs. AFOSR TR-59-34; AD-213 037.
Order from LC mi$1.80, ph$1.80 PB 142 099

An attempt was made to test the hypothesis that conduction velocity might be the central basis of color discrimination. Flashes of 5 different colors at equal intensity were delivered to the eye of a monkey. The color filters transmitted broadly, 50 mμ at 1% transmission, and had peak transmissions at above 600, at 580, 560, 510 and 450 mμ. Three types of cortical cells were found; those with selective spectral sensitivity responding to one or at most 2 colors; those responding to all colors; and cells responding not at all to light whether the eye were dark adapted or in light. The response to optic nerve stimulation was of 2 types. Some cells responded with one or 2 spikes with no significant

change in latency irrespective of the stimulus, indicating that these cells were fired by one radiation fiber. Other cells responded with a burst of spikes and the latency of this burst decreased with increasing stimulus intensity, which indicated overlap or convergence of a number of radiation fibers on the single cell. These cells tended to respond to all colors. A few cells responded to optic nerve stimulation, but not to any of the colors used. One cell responded to changes in background illumination and to optic nerve stimulation but not to color flash.

Cedars of Lebanon Hospital, Los Angeles, Calif.
THE EFFECT OF HEPARIN UPON THE TOTAL OXYGEN CONSUMPTION OF ATHEROSCLEROTIC INDIVIDUALS, by Hyman Engelberg. Rept. on Contract AF 18(600)1703. 21 Sep 57, 18p. 30 refs. AFOSR TN-57-632; AD-136 617.
Order from LC mi$2.40, ph$3.60 PB 137 462

In the present study, total oxygen consumption was measured in atherosclerotic individuals before and after heparin, thus eliminating the need for determinations of blood flow. Data was also obtained of the rate of oxygen uptake by erythrocytes after heparin. This will be presented in a separate report.

Army Medical Research and Nutrition Lab., Denver, Colo.
AN EVALUATION OF RENAL FUNCTION UTILIZING RADIOIODINE LABELED DIODRAST, by John G. Maier. 24 Mar 59, 56p. 8 refs. Rept. 231.
Order from LC mi$3.60, ph$9.30 PB 142 113

An evaluation of renal function using radioactive Diodrast-I^{131} has been carried out. A relative qualitative baseline has been established for the normal renogram curve. A total of 55 patients with renal disease have been studied. Surgical experimental procedures have been performed on four dogs to further evaluate the renogram curve. The test seems most promising for investigating hypertension on a renal basis and for following the progression of chronic renal disease.

Aero Medical Lab. [Wright Air Development Center] Wright-Patterson AFB, Ohio
SUPINE POSITION AS A MEANS OF INCREASING TOLERANCE TO ACCELERATION, by Ernest E. Martin and James P. Henry. Aug 50, 14p. 6 refs. AF Technical rept. no. 6025.
Order from LC mi$2.40, ph$3.30 PB 142 257

A new supine hammock seat is described as a method for enhancing tolerance to positive acceleration. The protection afforded by the seat when used in a fixed position is compared with the conventional upright seated posture. Protection afforded in the supine seat while wearing a modified anti-G suit compressing the legs alone, exceeds that presently found when using an anti-G suit in the upright seated posture by approximately 1 g.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION. PART 1. CENTRIFUGE STUDIES, by H. O. Sieker. Rept. on Physiology of Negative Acceleration. June 52, declassified 5 Nov 53, 22p. 13 refs. WADC Technical rept. 52-87, Pt. 1; AD-2135.
Order from LC mi$2.70, ph$4.80 PB 142 259

Human subjects were exposed to negative acceleration with and without protection. The tolerance limit for negative acceleration was established as 2.5g for unprotected subjects in the upright seated position. The acceleration was limited to this level by the subject's discomfort and the bradycardia noted in the electrocardiogram. Conjunctival hemorrhages and cardiac asystoles were noted at 3 g. When the subject in the upright seated position was protected by means of counterpressure about the head and neck, the tolerance to negative acceleration was increased to 5 g. The tolerance limit for negative acceleration was found to be 4 g in the negative-g aspect of the USAF prone position bed.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
A SIMPLE CLINICAL TEST FOR BORON HYDRIDE EXPOSURE, by Dwight F. Miller, Anton Tamas, and Lawrence Robinson. Rept. on Health Hazards of Materials and Radiation. Apr 59, 16p. 15 refs. WADC Technical rept. 59-123 593; AD-213 593.
Order from OTS $0.50 PB 151 869

A simple, accurate test for the detection of boron-derivative, high-energy fuels in biological systems is presented. A preferential extraction of the serum eliminates the interference from dietary or background boron. The test, a colorimetric determination based on the curcumin reaction, has a sensitivity of 0.05 gamma of boron per milliliter of serum. The reproducibility is $\pm 5\%$. Pertinent biochemistry is discussed.

Army Medical Research and Nutrition Lab., Denver, Colo.
THE EFFECT OF INTRAVENOUS ADMINISTRATION OF D-RIBOSE AND D-XYLOSE ON URINARY EXCRETION OF KETOPENTOSE IN MAN, by Edwin L. Bierman, Eugene M. Baker, and Irvin C. Plough. 21 Apr 59, 18p. 36 refs. Rept. 232.
Order from LC mi$2.40, ph$3.30 PB 142 112

The intravenous administration of either D-ribose or D-xylose to man results in a marked increase in urinary excretion of ketopentoses, predominantly D-xylulose. It is confirmed that, in contrast to xylose, ribose is more rapidly removed from blood and less appears in urine. A relative hypoglycemia is produced by intravenous ribose, while prolonged elevation of blood glucose is observed following xylose infusions. It is suggested that ribose, as well as xylose, share the same renal tubular reabsorptive mechanism with glucose.

California U. [Berkeley]
AMINO ACID BIOSYNTHESIS, by Edward A. Adelberg. Final technical rept. for 1 Apr 50-31 Mar 57 on Contract N7onr-29531. Jan 58, 14p. 16 refs.
Order from LC mi$2.40, ph$3.30 PB 139 373

This report is to serve as a recapitulation and summary of the work which has been described in detail in the Annual Progress Reports and publication reprints, and to add data obtained in the period between the last progress report and close of work. With the exception of the latter item, then, detailed accounts will not be necessary. Instead, an index is provided which shows, for each topic under study, the progress reports and publications in which detailed information can be found. Following the index is a series of brief summaries of the topics listed in the index. Finally, a detailed report is given for the last period of research, followed by some general conclusions concerning the entire contract.

Duke U., Durham, N. C.
RADIOFREQUENCY SPECTROSCOPY, by Walter Gordy, Ichiro Miyagawa and others. Progress rept. no. 24, 1 Feb-1 May 58, on Contract DA 36-034-ORD-1233. 1958, 56p. 19 refs. AD-137 101.
Order from LC mi$3.60, ph$9.30 PB 140 972

Covers the following two reports: On the nature of free radicals detected by paramagnetic resonance in biological substances. Electron spin resonance studies of radiation damage to proteins.

Hormel Inst., U. of Minnesota, Austin.
ANALYSIS, PROPERTIES AND METABOLISM OF LIPIDS, by Ralph T. Holman. Final rept. for 1 Sep 51-31 Aug 58 on Contract N8onr-622(18). 31 Aug 58, 9p.
Order from LC mi$1.80, ph$1.80 PB 142 241

A summary of the work of the several units into which the research was divided.

Pathology

Airborne Instruments Lab., Cutler-Hammer, Inc. [Mineola, N. Y.]
A SYSTEM FOR MONITORING THE ELECTROCARDIOGRAM DURING BODY MOVEMENT, by Walter E. Tolles and William J. Carbery. Rept. on Instrumentation Research, Contract AF 33(616)5473. Apr 59, 50p. WADC Technical rept. 58-453; AD-215 538.
Order from OTS $1.25 PB 151 906

This investigation was undertaken to develop a system for monitoring the electrocardiogram during body movement. Two new lead systems were devised that produced interpretable electrocardiograms and were insensitive to moderate body movements. A new stainless-steel mesh electrode designed for this investigation provided technically satisfactory electrocardiograms during all body movements. The best method of applying these electrodes to the skin was with adhesive tape. Good electrode-to-skin contact was obtained for as long as 6 hours. For monitoring of the electrocardiogram with the new lead system, a recording frequency band pass of 0.1 to 20 cps produced interpretable electrocardiograms during moderate body movement. With more strenuous activities, a recording frequency band pass of 0.8 to 10 cps produced interpretable electrocardiograms; however, the amplitude and shape of the characteristic waves were modified.

Franklin Inst. Labs. for Research and Development [Philadelphia, Pa.]
SHORT DURATION HARMONIC ANALYSIS OF EEG DATA, by Ezra S. Krendel. Rept. on Aircrew Fatigue on Extended Missions, Contract AF 33(616)5181. Feb 59, 16p. 2 refs. WADC Technical rept. 59-66; AD-212 318.
Order from OTS $0.50 PB 151 868

Amplitude spectra were computed from .85 second samples of EEG data obtained from bipolar electrodes positioned at the left parietal and left occipital locations. Differences were obtained between these spectra as a function of the state of consciousness of the subject. The implications of these differences for an electronic discrimination scheme are discussed.

Industrial Biology Research and Testing Labs., Inc., Philadelphia, Pa.
CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS, III, by Morris V. Shelanski and Karl L. Gabriel. Rept. on Health Hazards of Air Force Materials, Contract AF 33(616)5595. June 59, 11p. 6 refs. WADC Technical rept. 59-124; AD-215 535.
Order from OTS $0.50 PB 151 910

Three crystalline substituted phenyl ethers, three DORK flame-resistant cotton fabrics, one untreated cotton sateen fabric, and four fungicidal-treated (fluorinated diphenyl sulfide) cotton sateen fabrics were studied via the prophetic patch test method on laboratory animals and volunteer human subjects to determine the primary irritant effect and the sensitization index of these materials. The patch test studies with rabbits indicated that there were no contraindications to proceeding with the patch testing on the human subjects. All of the materials were found safe to use in contact with the human skin after the test with the human volunteer subjects.

National Heart Inst., National Institutes of Health, Bethesda, Md.
THE APPLICATION OF A MONOAMINE OXIDASE INHIBITOR 1-PHENYL-2-HYDRAZINOPROPANE (JB-516), TO THE TREATMENT OF PRIMARY HYPERTENSION, by Louis Gillespie, Jr., Luther L. Terry, and Albert Sjoerdsma. [1959] 25p. 10 refs.
Order from LC $2.70, ph$4.80 PB 142 224

Recent studies in this laboratory have been designed to correlate changes in the metabolism of vasoactive amines such as serotonin and norepinephrine with alterations in blood pressure. It was found that a monoamine oxidase inhibitor, 1-phenyl-2-hydrazinopropane, markedly lowered the blood pressure in patients with severe hypertension. The drug has been administered to fifteen hospitalized hypertensive subjects in single oral daily doses of 12.5 to 50 mgm for 12 to 25 days. Significant lowering of the blood pressure was noted in fourteen patients, the predominant effect being on the standing pressure. The

range of maximal decreases in standing pressure was 57-108/44-68 mm Hg. Maximal effects were apparent within the first ten days of therapy, and the standing pressures returned to control levels 7 to 14 days after stopping therapy. A larger group of twenty outpatients has been maintained on 6.25 to 25 mgm of the drug per day for at least one year. Satisfactory control of blood pressures has been achieved in all but one case using this agent alone or in combination with chlorothiazide or hydrochlorothiazide. The undesirable side effects common to the ganglionic blocking agents are notably absent with the administration of this agent. Although this drug effectively inhibits monoamine oxidase in man, it has not been proved that this action is responsible for the hypotensive effects.

Office of Scientific Research and Development. Div. 9.
INHIBITION OF MITOSIS IN THE CORNEAL EPITHELIUM: COMPARISON OF THE EFFECTS OF MUSTARD, NITROGEN MUSTARDS, L, KB16, AND CERTAIN DERIVATIVES OF 1130, by J. S. Friedenwald and Roy O. Scholz (Wilmer [Opthalmological] Inst.) Rept. no. 46 on Contract OEMcmr-24. 15 Dec 43, declassified 23 July 59, 4p. ATI-30 949.
Order from LC mi$1.80, ph$1.80 PB 142 284

Experiments are described which compare the effects of mustard and nitrogen mustard when applied to an eye. Results show that mustard and the nitrogen mustards have qualitatively similar effects. KB16, in very low doses, also produces marked inhibition of mitosis in the cornea. L produced marked mitotic inhibition, only when administered in sufficient dosage to produce necrosis. Hydrolysates of 1130 were without significant effect. It does not necessarily follow, from these latter experiments, that the ethylene imine of 1130 is not toxic. It seems much more likely that it may fail to penetrate into the cells.

Stanford U. School of Medicine, Calif.
PROPHYLAXIS AND THERAPY OF EXPERIMENTAL FROSTBITE, by Frederick A. Fuhrman and Geraldine J. Fuhrman. Final rept. for 1 July 57-30 June 58 on Contract DA 49-007-md-873. 30 June 58, 26p. 31 refs. AD-162 087.
Order from LC mi$2.70, ph$4.80 PB 142 334

Since nearly all the damage from freezing and thawing is present by the time thawing is complete, the logical way to decrease freezing damage is to prevent or modify freezing, or to modify thawing; treatment after thawing will be of little benefit. Attempts to modify cold air-freezing of rat feet were (1) feeding propylene glycol, (2) "antifrostbite" ointments (vasodilators and silicone), and (3) alterations of body fluid composition by (a) extracellular electrolyte depletion, (b) primary water retention, (c) sodium depletion, and (d) potassium depletion. These methods were in general unsuccessful. Simulated acclimatization, produced by injection of thyroxine and adrenalcortical hormone, was of great benefit both in preventing severe hypothermia and in reducing tissue loss from frostbite. Modification of thawing was by immersion of the rat to the neck in water at +42°C. This rapid thawing of the air-frozen extremities significantly decreased final tissue loss over that in controls. We conclude that a healthy, vigorous animal, fed a good diet fortified with vitamins, naturally or artificially acclimatized and insulated against heat loss has the best known protection against cold. Should frostbite or hypothermia occur it should be immediately and rapidly warmed and the frozen part thawed as rapidly as possible.

Surgery

School of Aviation Medicine, Randolph [AFB] Tex.
DETECTION OF IMPAIRMENT OF OXYGENATION: ELECTROENCEPHALOGRAPHY AND OXIMETRY DURING INTRATHORACIC SURGERY, by Werner K. Noell, Elwyn S. Brown, and James O. Elam (Roswell Park Memorial Inst.). Rept. on Contract AF 18(600)108. Jan 54, 14p. 22 refs. Proj. no. 21-1201-0005, rept. no. 2.
Order from LC mi$2.40, ph$3.30 PB 140 980

Oximetric and electroencephalographic measurements were performed on 90 patients during intrathoracic surgery (cardiac valvular operations, lobectomy, pneumonectomy, thoracotomy), Anesthesia was either accomplished by nitrous oxide-ether (type I) or by pentothal-demerol-nitrous oxide (type II). A decrease in oxygen saturation below 90 percent was observed in 30 patients. Cerebral hypoxia during anesthesia was found to produce the same brain wave changes as are associated with increased depth of anesthesia. The magnitude and character of the EEG change in response to hypoxia depended upon the pattern of the prehypoxic EEG which in most cases was determined by type and depth of anesthesia. It is concluded that the reaction of the electrical brain activity to hypoxemia varies generally with the degree anesthesia has depressed this particular manifestation of brain function.

Pisa U. (Italy).
RESEARCH ON THE RELATION OF THE BRAIN STEM RETICULAR FORMATION TO ANIMAL BEHAVIOR, by Giuseppe Moruzzi. Technical rept. no. 1, 15 Dec 56-15 Dec 58, on Contract AF 61(514)1125. 15 Dec 58, 15p. 20 refs. AFOSR-TR-59-39; AD-214 193.
Order from LC mi$2.40, ph$3.30 PB 142 276

CHEMISTRY

Analytical Chemistry

Army Chemical Warfare Labs., Army Chemical Center, Md.
THERMODYNAMIC ACTIVITY OF SARIN IN SOLUTION, by Arlyn W. Kinkel and Takeru Higuchi (U. of Wisconsin). Dec 58, 41p. 37 refs. CWL Special pub. 2-16.
Order from LC mi$3.30, ph$7.80 PB 142 248

The study described presents experimental data showing interaction behavior between sarin and a

large number of solvents of different types. These include perfluoro-tributylamine, hexadecane, water, tri-n-butylamine, Kel F Oil No. 1, tetralin, 2-pyrrolidone, diethylene glycol, carbon tetrachloride, phenyl ether, diisooctyl adipate, methyl salicylate, N-methylformamide, butryolactone, isoamyl alcohol, 2-butanone oxime, ethyl lactate, pentachloroethane, benzyl alcohol, 3-hydroxy-3-methyl-2-butanone, m-cresol, N-methylacetamide, dibutyl phthalate and salicylic acid. It is suggested that the interactions observed in this investigation should prove extremely useful in expanding the potentiality of sarin and related chemical warfare agents and in increasing their persistence. In connection with the study a method of vapour pressure determination of relatively nonvolatile solutes in solutions which may find application for chemical warfare substances has been developed and tried.

California Inst. of Tech., Pasadena.
AN ITERATIVE PROCEDURE FOR THE SOLUTION OF NOZZLE FLOW PROBLEMS WITH REVERSIBLE CHEMICAL REACTIONS, by R. Reichenbach and S. S. Penner. Technical rept. no. 28 on Contract DA 04-495-ORD-446. May 59, 21p. 7 refs. AD-216 090.
Order from LC mi$2.70, ph$4.80 PB 142 070

A simple iterative procedure has been developed for the solution of nozzle flow problems with one-step reversible chemical reactions. The efficiency of our method of calculation is illustrated by comparing our results with data obtained by Krieger through the use of machine computations for the recombination of hydrogen atoms in a de Laval nozzle. A zeroth-order approximation, which is actually fairly close to the correct answer, is obtained by utilizing the fact that the rate of change of mass fraction of reaction completed with distance, measured along the nozzle axis, goes through a stationary value in the vicinity of the nozzle throat because this parameter varies inversely with the square of the cross-sectional area at the nozzle throat.

Cornell U., Ithaca, N. Y.
ELECTRONIC BAND STRUCTURE OF SOLIDS BY THE METHOD OF EXPERIMENTAL X-RAY SPECTROSCOPY, by L. G. Parratt. Technical rept. no. 8 on Contract AF 18(600)300. 10 July 57, rev. 25 June 58. 109p. 76 refs. AFOSR TN-56-562; AD-110 382; Supersedes rept. dtd. 10 July 57, PB-129 667.
Order from OTS $2.50 PB 151 453

This review is intended to introduce and to orient the fundamental aspects of the subject in its present state of development for those physicists, chemists, metallurgists, etc., who have not had time to keep up with it.

Feltman [Research and Engineering] Labs., Picatinny Arsenal, Dover, N. J.
THE DETERMINATION OF TIN, IRON AND MOLYBDENUM IN TITANIUM OR TITANIUM ALLOYS, by Irving Kolier and Charles Ribaudo. Jan 55, 25p. 11 refs. Technical rept. 2106.
Order from LC $2.70, ph$4.80 PB 142 214

A method has been developed for the determination of tin, iron and molybdenum in titanium metal and alloys. The method involves the solution of the sample in concentrated hydrochloric acid, oxidation with hydrogen peroxide, and dilution to a specific volume. An aliquot of the solution is placed on a strip of specially prepared filter paper and chromatographed using a butanol-hydrochloric acid solvent mixture for a period of 4-6 hours. The tin, iron and molybdenum are separated from titanium and in many cases from each other in well-defined bands by ascending chromatography. The bands containing the metals are then cut from the paper strip. The tin is determined polarographically. The iron and molybdenum are determined colorimetrically.

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS, by J. H. Affleck. Scientific rept. no. 4 on Contract AF 19(604)4093. 10 June 59, 14p. 2 refs. AFCRC-TN-59-367; AD-217 319.
Order from LC mi$2.40, ph$3.30 PB 142 346

The use of oxide free seals and the increase in the quantity of cesium have resulted in a more favorable comparison in thermionic properties between the cesium-molybdenum system and the cesium-tungsten system than was noted previously. The true work function of the cesiated molybdenum filament was found to be 1.52 ev at 820°K. This value agrees with other published data. (See also PB 139 900)

Washington U. [Seattle].
GAS-LIQUID FRACTOMETRIC ANALYSIS OF MIXTURES CONTAINING METHYLDIBORANES, by G. R. Seely, J. R. Oliver, and D. M. Ritter. Rept. on Contract AF 18(600)1541. 25 June 59, 7p. 3 refs. AFOSR TN-59-398; AD-214 518.
Order from LC mi$1.80, ph$1.80 PB 142 300

The specific retention volumes, V_g, have been determined as functions of temperature for diborane, trimethylborane and the methyldiboranes on columns packed with mineral oil on pulverized fire-brick. Extensive investigation of the equilibria and kinetics of formation and interconversion of the methyldiboranes has become possible through application of the gas-liquid partition fractometer as a quantitative analytical device. The purpose of this contribution is to describe the analytical method itself.

Watertown Arsenal Labs., Mass.
SPECTROPHOTOMETRIC DETERMINATION OF MOLYBDENUM IN URANIUM ALLOYS, by E. F. Jacobson. Apr 59, 12p. 10 refs. Technical rept. WAL TR 425/1; AD-212 551.
Order from LC mi$2.40, ph$3.30 PB 142 425

The spectrophotometric thiocyanate determination of molybdenum without extraction was applied to uranium alloys. It was shown to be rapid, accurate, and free from interferences by alloying elements. A detailed procedure is given for the determination of molybdenum in uranium alloys.

Inorganic Chemistry

Callery Chemical Co., Pa.
B^{10} ISOTOPE ABUNDANCE IN SOME BORON COMPOUNDS, by R. S. Braman. Rept. on Project Zip, Contract NOa(s) 58-454-d. 25 Sep 58, 14p. 8 refs. Rept. no. CCC-454-TR-299.
Order from LC mi$2.40, ph$3.30 PB 142 164

A method has been developed for the measurement and comparison of the B^{10} isotope abundance by neutron absorption. Diborane and some higher boron hydrides produced at Callery Chemical Company have been found to be enriched in the B^{10} isotope. All B^{10} enriched materials were found to have approximately the same B^{10} abundance, 20.71 ± 0.22 atom-percent, when compared to commercial boric acid with an assumed B^{10} abundance of 19.98 atom-percent.

Hydrogen Peroxide Labs., Mass. Inst. of Tech., Cambridge.
QUARTERLY PERIODIC STATUS REPORT, by W. C. Schumb and C. N. Satterfield. Rept. on Contract Nonr-1841(11). 30 Sep 57, 37p.
Order from LC mi$3.00, ph$6.30 PB 138 900

Contents:
Stability of hydrogen peroxide
Flame velocities in hydrogen peroxide vapor
Ignition and decomposition flame above H_2O_2 solutions
High pressure ignition limits of hydrogen peroxide
Heterogeneous catalysis in liquid hydrogen peroxide
(See also PB 135 443)

Hydrogen Peroxide Labs., Mass. Inst. of Tech., Cambridge.
QUARTERLY PERIODIC STATUS REPORT, by W. C. Schumb and C. N. Satterfield. Rept. on Contract Nonr-1841(11). 31 Dec 57, 22p.
Order from LC mi$2.70, ph$4.80 PB 137 272

Contents:
Corrosion of steel and of aluminum in the presence of hydrogen peroxide
High pressure ignition limits of hydrogen peroxide vapor
Heterogeneous catalysis in liquid hydrogen peroxide
Ignition and decomposition flame above H_2O_2 solutions
(See also PB 138 900)

Hydrogen Peroxide Labs., Mass. Inst. of Tech., Cambridge.
QUARTERLY PERIODIC STATUS REPORT, by W. C. Schumb and C. N. Satterfield. Rept. on Contract Nonr-1841(11). 30 Sep 58, 14p.
Order from LC mi$2.40, ph$3.30 PB 142 086

Contents:
Stability studies
Heterogeneous catalysis in liquid hydrogen peroxide
Burning velocities of the H_2O_2 decomposition flame at low pressures
Hydrogen peroxide from the partial oxidation of propane
(See also PB 139 967)

Minnesota U. School of Chemistry, Minneapolis.
RECENT STUDIES OF THE BORON HYDRIDES, by William N. Lipscomb. [Rept. on Contract Nonr-710(23)]. 14 Aug 58, 55p. 75 refs.
Order from LC mi$3.60, ph$9.30 PB 140 944

The several sections of this review include the structures, the valence theory of known structures with emphasis on the charge distribution, the nuclear resonance studies of hydrides, derivatives and related compounds, the topological extension of the valence theory and its use in making predictions, and finally some brief remarks on the interconversions of the hydrides.

New York U. Coll. of Engineering, N. Y.
RESEARCH ON THE PREPARATION OF PURE METALS, by Charles J. Marsel and Walter Brenner. Scientific rept. no. 2, 15 Sep-14 Dec 58, on Contract AF 19(604)4124. [1958] 37p. 19 refs. AFCRC-TN-59-190; AD-215 624.
Order from LC mi$3.00, ph$6.30 PB 142 291

The preparation of pure aluminum, lead and tin from the decomposition of their respective metal hydrides. Exploratory work was also carried out on the preparation and decomposition of barium hydride. Additional literature searches were conducted on the hydrides of gallium, arsenic and phosphorus.

Organic Chemistry

Aeronautical Research Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
PERARYLATED SILANES: A CLASS OF STABLE ORGANIC MOLECULE, by Leonard Spialter and Charles W. Harris. Rept. on Carbon-Heteroatom Chemistry. Jan 59, 22p. 22 refs. WADC Technical rept. 58-276; AD-211 610.
Order from OTS $0.75 PB 151 860

The perarylated silanes---molecules consisting only of silicon atoms and aromatic groups---show remarkable radiation and heat stability, even when exposed to the oxidative and hydrolytic influence of the atmosphere. These compounds promise interesting applications in improved materials when development engineers begin to exploit their unusual properties. The present report summarizes experimental findings on the synthesis and selected physical properties of various structural subgroups in the general class of perarylated silanes, including the phenyl-4-biphenylylmonosilanes, the phenyl-2-thienylmonosilanes, and selected silarylenes. The potential utility and areas of promise shown for these compounds are described and critically discussed.

California U., Los Angeles.
RESEARCH ON ACETYLENES, by Thomas L. Jacobs. Final rept. for 1 Feb 49-30 Sep 55 on Contract N6onr-27509. 31 Dec 57, 65p. 109 refs.
Order from LC mi$3.90, ph$10.80 PB 142 221

Two phases of acetylene chemistry have been investigated under this contract: (a) acetylene-allene rear-

rangement and (b) polymerization of substituted acetylenes. Essentially all of the research accomplished under (a) has been published. In this final report the work under (a) will be summarized very briefly and references to the appropriate technical reports will be included.

Callery Chemical Co., Pa.
SOLUBILITY OF DIBORANE IN n-PENTANE AND IN n-BUTANE, by J. W. Reed and J. F. Masi. Rept. on Project Zip, Contract NOa(s) 58-454-d. 30 Sep 58, 13p. 3 refs. Rept. no. CCC-454-TR-300.
Order from LC mi$2.40, ph$3.30 PB 142 165

The solubility of diborane in n-pentane and in n-butane was measured over the temperature range of -30°C to 0°C at pressures from 0 to 8 atmospheres absolute. The Henry's law constants (expressed as mole fraction diborane per atmosphere) for diborane in n-pentane are 0.0382, 0.0459, 0.0552 and 0.0706 at 0°, -10°, -20° and -30°C respectively. The constants for diborane in n-butane are 0.0484, 0.0587 and 0.0736 at -10°, -20° and -30°C respectively.

Duke U., Durham, N. C.
FUNDAMENTAL RESEARCH IN ORGANIC FLUORINE CHEMISTRY, by Lucius A. Bigelow. Terminal rept. for 1 Sep 53-31 Aug 58 on Contract Nonr-1181(02). 31 Aug 58, 13p.
Order from LC mi$2.40, ph$3.30 PB 140 952

Studies have been made under various conditions of the direct fluorination of $CH_2(CN)_2$, CH_3CONH_2, CH_3SCN, $(PNCl_2)_3$, CF_3CN, CF_3CF_2CN, and the indirect fluorination of $(CNCl)_3$.

Harvard U., Cambridge, Mass.
PROTON MAGNETIC RESONANCE ABSORPTION IN FERROCENE AND ITS DERIVATIVES, by L. N. Mulay. Technical rept. on Contract Nonr-1866(13). Sep 58, 14p. 18 refs.
Order from LC mi$2.40, ph$3.30 PB 142 085

This is the third and final report on the project dealing with a study of sandwich compounds. In the present report results of more refined theoretical calculations of second moments for different motional models of the ferrocene molecule are presented, which take into account the effects of nearest neighboring protons in the ferrocene crystal. A comparison of these with the observed values for the second moments supports beyond doubt the concept of rotation of the cyclopentadiene rings in the ferrocene crystal, and sheds more light on the nature of this molecular motion.

Illinois Inst. of Tech., Chicago.
THE VINYL CARBANION, by Sidney I. Miller and Warren G. Lee. Technical rept. no. 1 on Contract AF 49(638)39. Jan 59, rev. Apr 59, 27p. 29 refs. AFOSR TN-59-147; AD-210 981.
Order from LC mi$2.70, ph$4.80 PB 142 432

Preliminary results are reported which establish upper limits for the pK of some alkenes and lower limits for the energy barriers of related carbanions. In the light of these observations, a general mechanism of elimination reactions is proposed.

Kansas U., Lawrence.
REDUCTION IN ORGANIC COMPOUNDS BY LOWER VALENT SPECIES OF ACTIVE METALS, by Jacob Kleinberg and W. E. McEwen. Technical rept. no. 8, 1 Aug 56-15 Oct 57, on Contract DA 23-072-ORD-1048. [1957] 16p. 15 refs. AD-137 009.
Order from LC mi$2.40, ph$3.30 PB 140 946

The reduction of nitrobenzene, nitrosobenzene, azoxybenzene and azobenzene by unipositive magnesium anodically generated has been investigated. Where conditions permitted, isolation of reduction products in amounts corresponding to those expected from oxidation of magnesium from its measured valence number to the dipositive state was achieved. Evidence is presented to show that in each case the intermediate product of "anodic reduction" is capable of corroding massive magnesium by a chain mechanism.

Pennsylvania State U., University Park.
SPECIFIC ROTATIONS OF PURE 2-BROMOBUTANES. STEREOCHEMISTRY OF THE 2-BUTANOL TO 2-BROMOBUTANE CONVERSION, by P. S. Skell, R. G. Allen and G. K. Helmkamp. Rept. on Contract AF 49(638)457. 31 May 59, 19p. 7 refs. AFOSR [TN]-59-544; AD-216 560.
Order from LC mi$2.40, ph$3.30 PB 142 020

[Queens Coll., Flushing, N. Y.]
REPLACEMENT OF HALOGEN BY HYDROGEN IN NITRO ARYL HALIDES, by A. H. Blatt and Norma Gross. Final rept. on Contract DA 30-069-ORD-1289. 4 Mar 57, 2p. AD-143 347.
Order from LC mi$1.80, ph$1.80 PB 140 948

Research was conducted to establish the mechanism of the replacement of halogen by hydrogen in nitro aryl halides using hydriodic acid in dilute solution at room temperature as the reagent, and to determine the generality and usefulness of the reaction. The progress made toward these two goals, the unexpected discoveries made in the course of the work, and the new problems opened up by the work are summarized.

Wisconsin U. [Madison].
HYDROGEN BONDING STUDIES. II. THE ACIDITY AND BASICITY OF SILANOLS COMPARED TO ALCOHOLS, by Robert West. Rept. on Contract AF 49(638)285. 28 May 59, 19p. 18 refs. AFOSR TN-59-473; AD-215 716.
Order from LC mi$2.40, ph$3.30 PB 142 157

The hydrogen bonding acidity and basicity of some silanols and carbinols has been determined by the measurement of O-H stretching infrared band shifts upon admixture with the bases ether and mesitylene, and the acid phenol, respectively. The silanols studied are much more strongly acidic, but only slightly less basic, than the carbinols with analogous structure. The results for the silanols are discussed in terms of a model with strong π-bonding from oxygen to silicon in-

volving only one of the two unshared electron pairs on the silanol oxygen. Intermolecular association of silanols was also studied by infrared spectroscopy. Trimethyl- and triethylsilanol are somewhat more highly associated than the corresponding carbinols, and the hydrogen bonds formed between silanol molecules appear to be decidedly stronger than those involving alcohols.

Physical Chemistry

Avco Research Lab. [Everett, Mass].
A STATISTICAL THEORY OF CHEMICAL REACTION RATES, by James Keck. Rept. on Contract AF 04(645)18. 15 Apr 58, 21p. 16 refs. Research rept no. 20; AD-159 615.
Order from LC mi$2.70, ph$4.80 PB 142 335

A "statistical" theory of chemical reaction rates based on "scattering theory" in the strong coupling approximation is presented. The theory is developed explicitly for reactions involving the dissociation and recombination of a diatomic molecule in the presence of an atomic catalyst but is also readily applicable to other reactions. The theory formally includes Wigner's theory of three body recombination and the classical theories of both recombination and dissociation. A limited comparison with experiment shows reasonable agreement.

Brigham Young U., Provo, Utah.
RHENIUM TRIOXIDE, RHENIUM HEPTOXIDE AND RHENIUM TRICHLORIDE AS HYDROGENATION CATALYSTS, by William J. Bartley. Master's thesis. Technical rept. no. 6 on Contract AF 18(600)1164. Aug 58, 104p. 53 refs. AFOSR TN-59-76; AD-210 136.
Order from LC mi$5.70, ph$16.80 PB 142 192

Rhenium trioxide was prepared by 3 methods, the first 2 involving formation of a complex between rhenium heptoxide and anhydrous dioxane and the last method, tetrahydropyran as a complexing agent. Reductions were carried out in a high-pressure hydrogenation vessel. The reduction products were analyzed in a gas chromatograph, by refractive indicies, distillation, and/or chemical extraction, and the activities of the catalysts were determined. Results indicated that the heptoxide- and trioxide-derived catalysts were similar in their catalytic activities. The trichloride was slightly lower in its activity than the oxides. The reduction of cyclohexanone was catalyzed at 123°C with rhenium trioxide, while the heptoxide and trichloride required temperatures of about 150°C. The olefinic compounds such as 1-hexene were reduced at 95° to 100°C while styrene required slightly higher conditions due to its conjugation with the benzene ring. Nitro compounds and benzenoid compounds were the most difficult to reduce with the trioxide- and trichloride-derived catalysts. Nitrobenzene yielded aniline only below temperatures of 226° to 275°C, depending on the catalyst used. Benzene yielded slight reduction with the trichloride catalyst at 200°C. The trioxide, heptoxide, and trichloride catalysts were outstanding in their ability to reduce the carboxylic acids. In most cases, reduction was effected at 150° to 160°C. Most rhenium catalysts exhibited high activity toward the carboxyl group to some extent. The oxide catalysts showed an extremely high activity toward the hydrogenation of amides and anilides.

Brussells Free U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURE, by Paul Goldfinger, Marcel Ackerman and Michel Jeunehomme. Final technical rept. on Contract AF 61(052)19. Jan 59, 62p. 53 refs. AFOSR TR-59-32; AD-212 980.
Order from LC mi$3.90, ph$10.80 PB 142 100

The vaporization of ZnS, CdS, HgS, CdSe, HgSe, CdTe, HgTe from 400 to 1175°K, of sulfur, selenium, tellurium from 350 to 600°K, InAs, GaP, GaSb from 900 to 1250°K and of an iron-nickel alloy from 1400 to 1600°K have been investigated. Preliminary experiments on the evaporation of an alloy show that this method can give useful information on thermodynamic properties especially on activities of the components.

Bureau of Mines, Pittsburgh, Pa.
COMPARISON BETWEEN HOT-GAS IGNITION AND LIMIT FLAME TEMPERATURES, by M. Vanpée and H. G. Wolfhard. Rept. on Contract Nonr-1858(25). Sep 58, 14p. 7 refs. Proj. Squid Technical rept. BUM-26-P.
Order from LC mi$2.40, ph$3.30 PB 142 351

Experimental details are furnished and several tables concerning their characteristics on being burned with oxygen. Correlations are shown between ignition temperature and limit temperature.

Calvin Coll., Grand Rapids, Mich.
THE STABILITY AND SOLUBILITY OF AgO ALKALINE SOLUTIONS, by Thedford P. Dirkse and Brandon Wiers. Technical rept. no. 7 on Contract Nonr-1682(01). 20 Sep 58, 22p. 13 refs.
Order from LC mi$2.70, ph$4.80 PB 142 355

AgO is stable in boiling water and decomposes but very little at room temperature in strongly alkaline solutions. The presence of Ag_2O does not affect this stability but the presence of unoxidized silver does increase the rate of decomposition. AgO decomposes at room temperatures above 100°C. When AgO dissolves in strongly alkaline solutions the dissolved form is primarily AgO and $Ag(OH)_3^-$. The standard free energy of formation of the latter is -85,380 cal./mole.

Chicago U., Ill.
RADIATION INDUCED REACTIONS OF OLEFINS, by Priscilla C. Chang. Rept. on Contract AF 33(616)3875. Jan 59, 28p. 30 refs. WADC Technical note 59-12; AD-209 127.
Order from OTS $0.75 PB 151 857

The radiation chemistry of simple olefins has received relatively little study. Several studies showed that the olefin yields less gas and more polymer during radiolysis than does the corresponding paraffin, but the products, with the exception of some

analyses of the evolved gases, were not investigated. It appeared, therefore, that a more detailed study of the products of the radiolysis of such olefins might elucidate the role played by free radicals in their radiation chemistry.

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SHOCK WAVE AND FLAME INTERACTIONS, by George Rudinger. Rept. on Contract Nonr-1858(25). Dec 57, 50p. 32 refs. Proj. Squid Technical rept. CAL-74-p.
Order from LC mi$3.30, ph$7.80 PB 137 453

The wave diagram procedures described in Chapter III make it possible to treat the interaction of shocks and other waves with a plane flame front as part of a general nonsteady-flow system. Provided the effects of flow disturbances on the burning velocity and the amount of heat released are known or assumed, the calculations can be carried out to any desired degree of refinement warranted under the particular circumstances.

Fairchild Engine Div., Deer Park, N. Y.
EXPLORATORY STUDIES OF COMBUSTION IN SUPERSONIC FLOW. I. PLANE DETONATION WAVES. II. OBLIQUE DETONATION WAVES, by Robert A. Gross. Rept. on Contract AF 49(638)15. June 59, 63p. 19 refs. AFOSR TN-59-587; AD-216 769.
Order from LC mi$3.90, ph$10.80 PB 142 039

Methods for releasing chemical energy in supersonic flow were investigated. A study was made of (1) standing-stable detonation waves, both strong and Chapman-Jouguet types, (2) standing-stable oblique detonation waves, (3) combination in a boundary layer on a flat plate immersed in a supersonic stream, (4) combustion behind a wedge-shaped flame holder in supersonic flow, and (5) thermal ignition properties of mixtures of hydrogen with air and methane with air. An ignition hysteresis effect was found which permitted the detonation studies to be conducted over a wide range of initial stagnation temperatures. The detonation wave front was remarkably plane, although the flow field immediately behind the wave was subsonic and complex. Steady oblique detonations were produced in the supersonic test section. These waves also exhibited the ignition hysteresis effect. However, the flow field downstream of the wave was, under many conditions, still supersonic.

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
A THERMAL THEORY FOR RATES OF PROPAGATIVE BURNING, by Eli S. Freeman and Garry Weingarten. June 59, 27p. 11 refs. Technical rept. 2596.
Order from LC mi$2.70, ph$4.80 PB 142 275

Equations were derived for the steady-state burning of pressed columns of homogeneous mixtures of finely divided fuels and oxidants in which the ingredients undergo crystalline transition, fusion, and vaporization. The kinetics and thermodynamics of chemical and physical changes were considered, as well as thermal properties and particle size. The change in rates of burning as a function of particle size may be calculated from the derived equations. The method used to calculate the percentage of metal powder fuel giving the maximum burning rate is discussed, as well as other factors required for the theoretical evaluation of the data.

Grinnell Coll., Iowa.
CATALYST STRUCTURE AND REACTION MECHANISM. PART I. STRUCTURE OF SILICA-ALUMINA CRACKING CATALYST. PART II. MECHANISM OF ACID CATALYSIS, by Joseph D. Danforth. Technical rept. 10 on Contract N8onr-67100. Apr 56. 26p. 56 refs.
Order from LC mi$2.70, ph$4.80 PB 137 485

Based on additional experimental data and other literature data there can be given a more complete and consistent presentation of the structure of the cracking catalyst, its relationship to other acid catalysts, and an interpretation of the mechanism of acid catalyzed reactions of hydrocarbons than was given in the data of the previous report. IX dealing with these subjects.

Harvard U., Cambridge, Mass.
INVESTIGATION INTO IONIC DIFFUSION IN QUARTZ AND THE EFFECT OF IMPURITY IONS ON THE PROPERTIES OF QUARTZ, by Henry E. Wenden. Interim rept. for 31 July 54-30 June 55 on Contract DA 36-039-sc-56689. [1955] 62p. 11 refs.
Order from LC mi$3.90, ph$10.80 PB 142 371

Resistivity of natural clear quartz varies with temperature, applied voltage and time of passage of current over a range of 25° - 535°C. and 0-1200 volts D. C., during runs of duration up to eight weeks. The roles of interstitial impurity ions, electrolytic dissociation and free electrons in the mechanism of conduction in quartz are discussed. (See also PB 142 369)

Harvard U., Cambridge, Mass.
INVESTIGATION INTO IONIC DIFFUSION IN QUARTZ AND THE EFFECT OF IMPURITY IONS ON THE PROPERTIES OF QUARTZ, by Henry E. Wenden. Final rept. for 30 June 55-30 Sep 56 on Contract DA 36-039-sc-56689. [1956] 25p. 3 refs.
Order from LC mi$2.70, ph$4.80 PB 142 372

Resistivity of quartz with respect to electrode materials, the connection between resistivity and time of passage of current, activation energies of short term mechanisms and diffusion of dispersed metals into quartz. (See also PB 142 371)

Harvard U., Cambridge, Mass.
INVESTIGATION INTO THE EFFECTS OF RADIATION ON THE PHYSICAL PROPERTIES OF QUARTZ, by C. S. Hurlbut, Jr. Quarterly rept. no. 2, 1 Jan-31 Mar 54, on Contract DA 36-039-sc-56689. [1954] 14p.
Order from LC mi$2.40, ph$3.30 PB 142 370

Using specimens of synthetic quartz, index of refraction, density, hardness and diffusion experiments

have gone forward but it is still too early to give specific data in regard to any one of them.

Harvard U., Cambridge, Mass.
INVESTIGATION INTO EFFECTS OF RADIATION ON THE PHYSICAL PROPERTIES OF QUARTZ, by C. S. Hurlbut, Jr. Quarterly rept. no. 3, 1 May-31 July 54, on Contract DA 36-039-sc-56689. [1954] 16p.
Order from LC mi$2.40, ph$3.30 PB 142 369

Index of refraction measurements on synthetic quartz fall within the range of refractive index of natural quartz. The density of natural and synthetic quartz is essentially the same. Diffusion of ions of various elements into quartz has produced measurable changes both in the index of refraction and in the frequency of oscillators. (See also PB 142 370)

Illinois U., Urbana.
RESEARCH ON CHEMISTRY AND ELECTRO-CHEMISTRY OF RARE-EARTH METAL SALTS IN BASIC SOLVENTS, by Therald Moeller, Glenn W. Cullen and others. Final rept. on Contract AF 18(600)1535. 15 June 59, 76p. 30 refs. AFOSR TR-59-75.
Order from LC mi$4.50, ph$12.30 PB 142 305

The program has embraced a variety of problems dealing with the synthesis and handling of anhydrous rare-earth metal and thorium compounds; with the behaviors of such compounds in a number of anhydrous, basic solvents, with reactions in such media; and with the electrochemical characteristics of such solutions. The use of dimethylformamide as a solvent for organic substances suggested its application as an ionizing medium for inorganic salts. The sucessful use of this solvent as an ionizing medium and in compound formation has stimulated the work embodied in this report.

Illinois U. Engineering Experiment Station, Urbana.
ON THE SILICIDES AND SILICIDE-PHOSPHIDES OF THE IRON GROUP METALS, by K. Gingerich. Interim technical rept. for 1 Oct 57-15 Sep 58 on Preparation and Electrochemical Study of Noncorrodible Anodes, Contract N6ori-071(50). [1958] 48p. 85 refs.
Order from LC mi$3.30, ph$7.80 PB 140 987

Contents:
Procedures for the preparation of metal silicides and mixed silicide-phosphides
Procedures for the preparation of electrodes
Preparation of iron phosphides
Preparation of iron, cobalt and nickel-silicides
X-ray investigation of mixed silicide-phosphides
Corrosion tests

Kentucky U., Lexington.
ULTRAVIOLET SPECTRA OF N-SULFINYL AMINES. INFLUENCE OF STRUCTURE AND SOLVENT, by Walter T. Smith, Jr., Donald Trimmell, and Lowell D. Grinninger. Rept. on Contract AF 49(638)49. Oct 58, 7p. 7 refs. AFOSR-TN-58-899; AD-204 231.
Order from LC mi$1.80, ph$1.80 PB 137 470

The ultraviolet absorption spectra of some aliphatic and aromatic N-sulfinyl amines in hexane and cyclohexane have been reported by Mangini and Leandri (Spectrochim. Acta, 8, 283, 1956). The work reported here is concerned with the spectra of some of these compounds in ether and in alcohols.

Metcalf Research Lab., Brown U., Providence.
STRUCTURE OF SHOCK FRONTS IN VARIOUS GASES, by W. H. Andersen and D. F. Hornig. Technical rept. no. 8 on Contract Nonr-562(11). 22 May 58, 30p. 10 refs.
Order from LC mi$2.70, ph$4.80 PB 139 455

The optical reflectivity of shock fronts in A, N_2, O_2, CO, CO_2, N_2O, CH_4, NH_3, Cl_2 and HCl have been studied. The thickness of shock fronts in A up to M=1.55 is in agreement with the theory of Gilbarg and Paolucci. The rotational relaxation time is about 5.5 collisions in N_2 and equal to or less than that in the other gases. However, for stronger shocks N_2 does not appear to reach rotational equilibrium in the shock front and a qualitative theoretical discussion of this phenomenon is presented. In HCl there appears to be overexcitation of rotation in the shock front. There is no vibrational excitation of any of the gases.

Naval Research Lab., Washington, D. C.
WETTING OF LOW-ENERGY SOLIDS BY AQUEOUS SOLUTIONS OF HIGHLY FLUORINATED ACIDS AND SALTS, by Marianne K. Bernett and W. A. Zisman. Interim rept. 23 June 59, 16p. 14 refs. NRL rept. 5325.
Order from OTS $0.50 PB 151 696

The fluorinated compounds were able to depress the surface tension of water below the critical surface tension (γ_c) of Teflon, and were therefore capable of completely wetting it. Whenever possible, wettability curves were obtained for each solid surface by plotting the cosine of the contact angle versus the surface tension of the solution. The value of γ_c, 19 dynes/cm, thus obtained for Teflon is in reasonable agreement with the value of 18 dynes/cm established from previous studies. With polyethylene, a value of γ_c of 20 dynes/cm was obtained which is much lower than the established value of 31 dynes/cm. This led to experiments demonstrating that the phenomenon was caused by the adsorption of the fluorinated compounds on the polyethylene surface, thereby altering its wetting characteristics to those of a fluorinated surface. As expected from the difference in their surface energies, greater and more tenacious adsorption was observed on polyethylene than on Teflon.

Ohio State U. Research Foundation, Columbus.
STUDY OF INFRARED EMISSION FROM FLAMES, by Ely E. Bell, Phillips B. Burnside and others. Final rept., part 1, on Contract AF 30(602)1047. June 55, 49p. 7 refs. RADC TR-55-98; AD-76 047.
Order from LC mi$3.30, ph$7.80 PB 142 307

The purpose of this project is to investigate the radiation form relatively "non-luminous" flames and determine their infrared radiating properties.

Ohio State U. Research Foundation, Columbus.
STUDY OF INFRARED EMISSION FROM FLAMES, by Ely E. Bell, Cecil F. Dam and others. Final rept. part 2, on Contract AF 30(602)1047. Jan 56, 75p.
RADC TR-56-63; AD-96 443.
Order from LC mi$4.50, ph$12.30 PB 142 306

This is the second of a series of technical reports on sources of infrared emission. The main concern has been with the emission from flames, but a few hot solid sources have also been measured and their characteristics are being described in these reports. This study has as its purpose the measurement and analysis of the characteristics of flame sources, in order to promote an understanding that will help to make possible the construction of monochromatic sources having selected and predetermined characteristics. (See also PB 142 307)

Ohio State U. Research Foundation, Columbus.
THE VAPORIZATION OF BORON NITRIDE AND ALUMINUM NITRIDE, by M. Hoch and D. White. Technical research rept. 29 Oct 56. 9p. 10 refs.
MCC-1023-TR-214; AD-142 616.
Order from LC mi$1.80, ph$1.80 PB 137 398

The vaporization of boron nitride and aluminum nitride was studied by the Knudsen effusion method in the temperature range 1660-2196°K. The ratio of the surface of the effusion hole to that of the evaporating material, h/S, was varied from 0.572 to 1.23×10^{-4}. Although boron nitride has a crystal structure similar to graphite and aluminum nitride has a wurtzite structure, and although boron nitride decomposes into solid boron and gaseous nitrogen, while aluminum nitride decomposes into gaseous aluminum and gaseous nitrogen, the accommodation coefficient, was in both cases very small and of the same magnitude, 1×10^{-4}. The small accommodation coefficient cannot be ascribed simply to the structure of the solid or to the decomposition reaction. Furthermore, since the accommodation coefficients of titanium nitride and zirconium nitride were found to be close to unity, the high dissociation energy of nitrogen cannot be responsible for the small accommodation coefficient of boron nitride and aluminum nitride.

Oregon State Coll., Corvallis.
EFFECT OF DIVALENT CATIONS ON THE COAGULATION OF F-CENTERS IN KCl, by L. Richard Watson (Master's thesis) and Allen B. Scott. Technical rept. no. 2 on Magnetic Study of Color Centers in Alkali Halides, Contract Nonr-1286(05). 10 Sep 58, 5p. 10 refs.
Order from LC mi$1.80, ph$1.80 PB 142 268

This report describes experiments upon KCl containing $CaCl_2$, $SrCl_2$, or $BaCl_2$, colored additively by heating in alkali metal vapor.

Polytechnic Inst. of Brooklyn, N. Y.
THE STUDY OF RAPID BIMOLECULAR REACTIONS AND OF RELATED PROBLEMS, by R. A. Marcus. Final rept. for 1 June 53-30 Nov 57 on Contract Nonr-839(09). 1 Apr 58, 11p. 30 refs.
Order from LC mi$2.40, ph$3.30 PB 139 457

Theoretical studies include the formulation of a theory of electron transfer oxidation-reduction reactions, a theory of overvoltage, a treatment of systems having nonequilibrium dielectric polarization, and a method for interpreting kinetic data on complex isotopic exchange processes. Experimental studies include the adaptation of the exploding wire as a light source for flash photolysis. The light source was used to study the flash photolysis of acetone. The rates of several thermal reactions were determined. These studies included a measurement of the relative rates of reaction between boron trifluoride and several amines and an investigation of the reaction between diborane and phosphine.

Rhode Island U., Kingston.
STUDIES IN THE MECHANISM OF FREE RADICAL ADDITION OF HYDROGEN BROMIDE TO OLEFINS, by Paul I. Abell. Final rept. for 28 Oct 53-31 Oct 57, Contract DA 19-020-ORD-3171. 1957, 39p. 22 refs.
Order from LC mi$3.00, ph$6.30 PB 140 951

The purpose of this research was threefold: (1) To investigate the stereochemistry of the free radical hydrogen bromide addition to cyclic olefins (other than those already reported in the literature), (2) To investigate methods of synthesis of these olefins, and (3) to record physical constants of compounds not clearly defined in the literature.

St. Louis U., Mo.
FEASIBILITY STUDY OF TEMPERATURE AND DENSITY MEASUREMENTS IN GASES USING THERMAL NEUTRON SCATTERING, by R. M. Delaney and A. H. Weber. Final technical rept. on Feasibility Study of Thermal Neutron Scattering Measurement within Small Volume Elements of Ionized Gases, Contract DA 23-072-ORD-1295. 31 Jan 59, 17p. 3 refs. AD-210 757.
Order from LC mi$2.40, ph$3.30 PB 142 068

Syracuse U. Research Inst., N. Y.
INTERACTIONS OF ATOMS AND IONS WITH METAL SURFACES, by R. C. Abbott, H. W. Berry, and L. P. Levine. Final technical rept. on Contract Nonr-313(00). Sep 58, 84p. 19 refs.
Order from LC mi$4.80, ph$13.80 PB 142 289

Part I. The formation of hydrogen negative ions by the bombardment of a tungsten surface with hydrogen positive ions. Part II. The angular distribution of the electrons emitted from a tungsten surface under positive ion bombardment.

West Virginia U., Morgantown.
METAL ION COMPLEXES OF N, N'-BIS-(2-HYDROXYETHYL)-ETHYLENEDIAMINE. REACTION OF COPPER (II) COMPLEXES WITH SODIUM HYDROXIDE, by James L. Hall and Warren E. Dean. Technical rept. no. 2, 1 Oct 57-1 Oct 58, on Metal Ion Complexes of Oxygen-Substituted Amines, Contract DA 36-061-ORD-579. 16 Feb 59, 15p. 9 refs. AD-211 217.
Order from LC mi$2.40, ph$3.30 PB 142 063

Washington U. [Seattle].
KINETICS AND EQUILIBRIA IN THE ALKYLATION OF DIBORANE I, by Lloyd Van Alten, G. R. Seeley and others. Rept. on Contract AF 18(600)1541. 25 June 59, 15p. 5 refs. AFOSR TN-59-311; AD-213 243.
Order from LC mi$2.40, ph$3.30 PB 142 299

What is described here is a preliminary report of work on two phases concerning (1) the reaction between diborane and trimethylborane, and (2) the decomposition of monomethyldiborane.

Westinghouse Research Labs., Pittsburgh, Pa.
ELECTRICAL CLEANUP OF GASES. TRAPPING OF NOBLE GAS IONS AND THE RE-EMISSION OF THE TRAPPED ATOMS FROM NICKEL AND MOLYBDENUM, by J. H. Carmichael and J. S. Knoll. Rept. for July-Sep 58 on Contract AF 18(600)1049. 19 Nov 58, 3p. 1 ref. Research rept. 71F191-R18.
Order from LC mi$1.80, ph$1.80 PB 137 498

Report is a summary only of activities for the quarter-year covered. (See also PB 136 138)

EARTH SCIENCES

Marine Lab., U. of Miami, Coral Gables, Fla.
A TECHNICAL REPORT OF INVESTIGATION FOR THE PERIOD OF JUNE 25, 1956 to MAY 7, 1957, by Frank Chew and L. P. Wagner. Rept. on Contract Nonr-840(01). Sep 58, 54p. 2 refs. Rept. 58-3.
Order from LC mi$3.60, ph$9.30 PB 142 356

Eleven cruises were undertaken during the period 25 June 1956 to 7 May 1957; these cruise data are tabulated.

Naval Postgraduate School, Monterey, Calif.
METEOROLOGY AND OCEANOGRAPHY THESES ABSTRACTS (1948-57), by Robert J. Renard. June 57, 116p. 7 refs. Research paper no. 13.
Order from LC mi$6.00, ph$18.30 PB 142 455

The summaries presented herewith are divided into forty-eight meteorological and six oceanographical topics. The theses are on file at the Library of the United States Naval Postgraduate School. Arrangements for loan should be made with that function of the school.

Seismological Observatory, John Carroll U., Cleveland, Ohio.
ANALYSIS OF DISPLACEMENTS CAUSED BY QUARRY BLASTS, by Henry F. Birkenhauer. Rept. on Contract DA 33-019-ORD-2452. May 57, 48p. 16 refs. AD-138 913.
Order from LC mi$3.30, ph$7.80 PB 142 080

Based on analyses of blasts and the variability present in the results, a statistical method is presented to test the data from a group of blasts for the presence of variables other than charge weight and distance. Essentially, the method distinguishes whether the displacements vary because of chance or because of other causes which should be controlled by the blaster. If the variation is the result of chance, the limits within which the values can be expected to fall in the future can be assigned, and this assurance can be expressed as a probability. If the variation is caused by other factors, the method indicates where to look for them. This procedure can be extended to analyze the data from other types of explosions so as to estimate the limits within which the measured displacement, or velocity, or acceleration will lie in the future.

Climatology and Meteorology

Woods Hole Oceanographic Institution, Mass.
TROPICAL METEOROLOGY OBSERVATIONAL STUDIES OF TROPICAL CLOUDS: RESULTS OF 1956 CARIBBEAN AIRCRAFT EXPEDITION, by Ruth Wexler and Joanne Malkus. Technical rept. no. 3 on Contracts Nonr-1721(00) and Cwb-9241. Sep 58, 125p. 14 refs. Reference no. 58-46.
Order from LC mi$6.30, ph$19.80 PB 142 290

Tropical cumulus cloud observations made from a calibrated PBY-6A aircraft are presented. Limitations imposed by instrumental, reduction, and sampling problems were severe and are described. An interesting case of tropical disturbance passage (August 15-16) is studied in detail, with joint cloud runs and synoptic analysis.

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
STUDY OF FORECASTING LOW-LEVEL WIND GRADIENTS, by Alfred K. Blackadar. Final rept. on Contract AF 19(604)2059. 15 Jan 59, 106p. 43 refs. AFCRC-TR-59-220; AD-211 358.
Order from LC mi$5.70, ph$16.80 PB 142 408

The eddy viscosity distribution has been determined as function of height and time of day during a composite period of 24 days at Wichita and Oklahoma City between the levels of 50 and 1800 m above the surface. The geostrophic departure method was used but it was found necessary to replace the measured geostrophic winds by values derived indirectly. At night the eddy viscosity falls to values which are less than one-tenth the daytime values. At night there is a minimum value of eddy viscosity at 400 m. Between 1200 and 1800 CST the eddy viscosity, after increasing with height below 50 m, remains roughly constant up to 800 m, and then increases with greater heights. It is demonstrated that a power law fits the observed vertical distribution of wind speed at Brookhaven between 11 and 125 m better than does a logarithmic law. The variation of exponent with stability, wind speed, and surface roughness is determined and explained physically. It is shown that the wind direction and speed at the anemometer level

are affected by the horizontal temperature gradient in addition to surface pressure gradient, stability, surface roughness, and geostrophic wind speed.

North Pacific Div., Corps of Engineers, Portland, Oreg.
SNOW HYDROLOGY. Summary Rept. of the Snow Investigations. 30 June 56, 621p. 242 refs.
Order from OTS $8.00 PB 151 660

This report is intended as a reference. Although the information was developed mainly from studies of mountainous areas in the western United States, the basic relationships derived are applicable to all regions in which snowfall is of appreciable hydrologic concern. The information is intentionally presented in considerable detail and includes technical background material necessary to a general understanding of the subject matter, together with methods and examples of application.

Chap. 1. Introduction
Chap. 2. Snow laboratory data
Chap. 3. Precipitation and snow accumulation
Chap. 4. Water balance in areas of snow accumulation
Chap. 5. Melting of the snowpack
Chap. 6. Snowmelt indexes
Chap. 7. Areal snow cover
Chap. 8. Effect of snowpack condition on runoff
Chap. 9. Hydrograph synthesis
Chap. 10. Design flood determination
Chap. 11. Seasonal runoff forecasting
Chap. 12. Reservoir regulation

Naval Research Lab., Washington, D. C.
ENVIRONMENTAL FACTORS AFFECTING ALTITUDE PERFORMANCE AND CONTROL OF CONSTANT-VOLUME BALLOONS, by H. J. Mastenbrook. Interim rept. 30 June 59, 37p. 4 refs. NRL rept. 5322.
Order from LC mi$3.00, ph$6.30 PB 139 793

The U. S. Navy is presently operating a meteorological data system known as the transosonde which collects meteorological trajectory data over broad expanses of ocean area. The transosonde is essentially a balloon-borne meteorological station which is controlled to float at approximately the 300-millibar level; the data are considered to be applicable to analysis of that level. The representativeness of the data collected is dependent, among other things, upon the effectiveness of altitude control in maintaining flight close to the reference level. Early flights in the transosonde program have shown deviations from the desired flight level range up to 4000 feet, which is considered excessive for meteorological purposes.

Naval Ordnance Test Station, China Lake, Calif.
HIGH-ALTITUDE ATMOSPHERIC DENSITY CALCULATOR, by Paul H. Miller. Apr 59, 12p. NOTS TP-2230; NAVORD rept. 6535.
Order from LC mi$2.40, ph$3.30 PB 142 012

A circular slide-rule-type calculator has been constructed for computing atmospheric densities to an altitude of approximately 118,000 ft. This calculator is easily operated and decreases materially the time required for determining densities as compared to other methods. Its accuracy is as great as is justified by the accuracy of the meteorological data used in the computations. Densities may be read directly from the calculator in any of three different sets of units: pounds per cubic foot, slugs per cubic foot, or grams per cubic centimeter.

Melpar, Inc., Boston, Mass.
STUDY AND EVALUATION OF TWO-HOUR OBJECTIVE TERMINAL FORECAST TECHNIQUES, by Carl F. Jenkins and Paul F. Twitchell. Final rept. for 1 June 57-28 Feb 59 on Contract AF 19(604)2450. [1959] 219p. 74 refs. AFCRC TR-59-215; AD-210 484.
Order from LC mi$9.60, ph$33.30 PB 142 186

Several known objective forecast techniques developed for specific forecast problems and prediction techniques designed for non-meteorological problems were reviewed during the study program. The applicability of these methods to the short-range ceiling and visibility forecasting problem was determined. Methods reviewed included a screening technique, a factor analysis method, a graphical regression procedure, linear regression, and a contingency table method, herein termed a grouping method. The study program involved a comprehensive test and evaluation program using electronic computer techniques as well as manual analysis and computations to determine the relative merits of the several available techniques when applied to the particular forecast problem under study. Conclusions and recommendations are made on the basis of this study's results. These conclusions include suggestions for further development of some of the methods, and the application of objective methods as the present state of development permits.

Massachusetts Inst. of Tech., Cambridge.
THE VARIABILITY OF COLD FRONT PRECIPITATION, by James M. Austin and R. H. Blackmer, Jr. Research rept. no. 27 on Weather Radar Research, Contract DA 36-039-sc-71136. July 56, 28p. 7 refs.
Order from LC mi$2.70, ph$4.80 PB 142 065

Summertime cold fronts have been selected for study for two reasons. First, the extent of cold front precipitation is such that the radar can, in general, "see" the entire precipitation pattern of a section of the fornt; also, the convective nature of most summertime precipitation enables the radar to detect the precipitation at the maximum range of the radar. Second, the simplicity of the cold front makes comparison of different cold fronts much easier than the comparison of cyclones which vary widely in size and intensity and may be in various states of occlusion.

Massachusetts Inst. of Tech., Cambridge.
STUDIES IN RADAR CLIMATOLOGY, by Roy H. Blackmer, Jr., and Paul Morgenstern. Research rept. no. 25 on Weather Radar Research, Contract DA 36-039-sc-71136. June 56, 57p. 9 refs.
Order from LC mi$3.60, ph$9.30 PB 142 067

Two studies in radar climatology are considered in this report. The first part of the report presents a discussion of the correlation of radar scope coverage with

certain parameters which describe the sea level pressure pattern. The second part describes an investigation of the lifetimes of small precipitation areas.

Massachusetts Inst. of Tech., Cambridge.
SOME OBSERVED NATURAL CLOUD DROP DISTRIBUTIONS, by D. P. Keily. Scientific rept. no. 6 on Measurement of Drop Size Distribution and Liquid Water Content in Natural Clouds, Contract AF 19(604)1287. 15 Dec 57, 11p. 7 refs. AFCRC-TN-58-488.
Order from LC mi$2.40, ph$3.30 PB 137 366

Drop size distributions in natural cloud have been observed by an airborne electric charge probe and an oiled glass slide drop catcher. In general, drop counts increase toward the minimum size measurable by the instruments, which is about two microns.

Massachusetts Inst. of Tech., Cambridge.
THE SHAPE OF RAIN AND SNOW AT MICROWAVE-LENGTHS, by Reginald E. Newell, Spiros G. Geotis and Aaron Fleisher. Research rept. no. 28 on Weather Radar Research, Contract DA 36-039-sc-71136. Sep 57, 109p. 34 refs.
Order from LC mi$5.70, ph$16.80 PB 142 064

The matters of concern are the signals returned from meteorological targets when the illumination is circularly polarized at 3.2 centimeters.

Massachusetts Inst. of Tech., Cambridge.
RADAR MEASUREMENT OF GUSTINESS, by Roddy R. Rogers. Research rept. no. 29 on Weather Radar Research, Contract DA 36-039-sc-71136. Feb 57, 60p. 8 refs. AD-139 652.
Order from LC mi$3.60, ph$9.30 PB 142 234

Fluctuations in the radar signal are caused by the shuffling of the precipitation particles. Information about wind structure in the sampled volume is contained in these fluctuations, since wind accounts for many of the movements of particles. The R-meter is an instrument which counts the number of times the fluctuating signal crosses an arbitrary level, which rate is directly proportional to the sum of the variances of the distribution of particle velocities in the direction of beam caused by wind shear, gustiness, and differential fall velocities. The calibration and limitations of the instrument are discussed and results of measurements taken in widespread snow and convective showers are presented.

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENT OF WEATHER NOISE, by Melvin L. Stone and Aaron Fleisher. Research rept. no. 26 on Weather Radar Research Contract DA 36-039-sc-71136. May 56, 44p. 19 refs.
Order from LC mi$3.30, ph$7.80 PB 142 066

McGill U. (Canada).
EXTRAPOLATION OF 25 MB HEIGHTS AND TEMPERATURES OVER NORTH AMERICA NORTH OF 50°, by Svenn Orvig. Scientific rept. no. 3 on Contract AF 19(604)3865. May 59, 40p. 7 refs. Arctic Meteorology Research Group Pub. in Meteorology no. 14; AFCRC TN-59-292; AD-215 932.
Order from LC mi$3.00, ph$6.30 PB 142 028

The present report describes objective techniques whereby 25 mb heights and temperatures may be extrapolated from observed or computed values at 50 mb. It will be followed by an account of the climatology of this layer over arctic North America.

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC ELECTRON DENSITIES FOR WASHINGTON D. C., PANAMA, TALARA, AND HUANCAYO FOR OCTOBER-NOVEMBER-DECEMBER, 1957, by E. R. Schmerling. Scientific rept. no. 118 on Ionospheric Research, Contract AF 19(604)3875. 27 Apr 59, 258p. 3 refs. AFCRC-TN-59-407; AD-216 696.
Order from LC mi$11.10, ph$39.60 PB 142 411

These tables have been computed from routine ionograms by the matrix method of Budden (1955). The tables give electron densities at intervals of 20 km. every hour for the Regular World Days and the 10 magnetically quietest days. The first column gives heights in kilometers; subsequent columns give the corresponding electron densities at those heights in units of 10^3 electrons/cc. Times are given in the top row. These are local zone times, differing from UT by an integral number of hours. The symbol NmF denotes the maximum electron density, as obtained from f_oF2. On occasions when f_oF2 was not well defined, a dash has been entered in this position.

Intermountain Weather, Inc., Salt Lake City, Utah.
THE LONG WAVE FLUX DENSITY LEAVING THE EARTH UNDER VARIOUS METEOROLOGICAL CONDITIONS, by J. Vern Hales and Wilford G. Zdunkowski. Scientific rept. no. 1 on Contract AF 19(604)2418. Jan 59, 63p. 35 refs. AFCRC-TN-59-212; AD-212 552.
Order from LC mi$3.90, ph$10.80 PB 142 413

The long wave thermal radiation flux density leaving the planet earth is determined for various meteorological air masses. Emission of infrared radiation by the surface of the earth as modified by water vapor, carbon dioxide, and ozone is calculated by means of Elsasser radiation charts. The meteorological data used are those given by Petterssen, which do not represent climatological means, but certain typical situations. Lacking exact descriptions of the water vapor structure of the stratosphere, flux densities are calculated for two variant conditions, a dry and a moist stratosphere. Little difference results. It is assumed that all air masses, except those of distinctly dry charcter, might include clouds whose tops are found at one of the following levels: 800 mb, 700 mb, 500 mb, 300 mb, and 200 mb. Hence flux densities are calculated for clear and clouded sky, with the result that cloud top data are found to be extremely important. Since the soundings contain only shelter temperatures, whereas soil temperatures are needed, seven different temperatures for

the ground are assumed for each individual case. Ground temperature is shown to be very important.

Institute of Geophysics, U. of California, Los Angeles
MODERN INSTRUMENTS FOR ATMOSPHERIC-ELECTRIC MEASUREMENTS. PART I, by G. F. Schilling, L. G. Smith and others. Scientific rept. no. 5 on Contract AF 19(122)254. 1 Feb 53, 28p. 8 refs.
Order from LC mi$2.70, ph$4.80 PB 142 279

The instruments described in this report have been developed to measure the atmospheric potential gradient and electrical conductivity. The potential gradient meters are of two types: those using the principle of electrostatic induction, and those using a potential equalizer, in these cases, a radioactive collector. The conductivity meters are of the type originated by Gerdien but with a modified electrical system. The instruments have been designed to be automatically recording and, in some cases, to have self-contained power supplies.

Florida State U. [Tallahassee]
PREDICTION AND DECISION METHOD FOR APPLIED METEOROLOGY AND CLIMATOLOGY, BASED PARTLY ON THE THEORY OF GAMES, by Thomas A. Gleeson. Scientific rept. no. 1 on Contract AF 19(604)4986. 1 June 59, 36p. 12 refs. AFCRC TN-59-258; AD-212 555.
Order from LC mi$3.00, ph$6.30 PB 142 200

With the aid of examples, a prediction and decision method is described for use in applied meteorology or climatology where economic consequences have been evaluated beforehand. The predictand, which may be a single variable or several variables in combination, is divided into a finite number of forecast classes. Confidence limits of the relative frequency of each predictand class are necessary. The mathematical theory of games of strategy is utilized, but elementary algebra suffices for all required computations. The method gives decisions and predictand frequency distributions that tend to minimize expenses (or maximize minimum gains) in ventures affected by weather or climate regardless of how uncertain either of the latter may be.

Electrical Engineering Research Lab., U. of Texas, Austin.
A PRELIMINARY CLIMATOLOGY OF REFRACTIVE INDEX LAYER CHARACTERISTICS. II. SOUTHERN CALIFORNIA COASTAL AREAS, by N. K. Wagner. Rept. on Contract AF 19(604)2249. 20 May 59, 57p. 16 refs. Rept. no. 6-28; AFCRC TN-59-193; AD-215 824.
Order from LC mi$3.60, ph$9.30 PB 142 288

A total of 799 refractometer index of refraction profiles obtained in the Southern California coastal region over roughly a five year period are analyzed in an attempt to establish a preliminary index of refraction layer climatology of this area. Frequency distributions showing the monthly occurrence of various layers and the variations in the height, thickness and strength of these layers are presented. It is found that the summer months have a ducting layer frequency of occurrence near 100% and a substandard layer occurrence near 40%. The winter months are practically free of substandard layers but ducting layers are still present about 65% of the time. The major non-standard layers are shown to be closely related to large scale atmospheric flow patterns and a basis for layer forecasting is briefly presented. A comparison between radiosonde and refractometer ducting layer frequency of occurrence data suggests that the radiosonde is incapable of detecting approximately 15% of the significant ducting layers which occur in the atmosphere.

Deutscher Wetterdienst, Aachen (West Germany).
POTENTIAL GRADIENT AND SFERICS: ATMOSPHERIC ELECTRIC RESULTS AND GLOBAL THUNDERSTORM ACTIVITY: A CONTRIBUTION TO LARGE AREA SYNOPTICAL INVESTIGATIONS, by Ernst Theunissen. Technical note no. 10 on Contract AF 61(514)640. [1957] 59p. 16 refs. AFCRC TN-58-433; AD-152 604.
Order from LC mi$3.60, ph$9.30 PB 137 363

Whipple's and Scrase's theory regarding the connection between potential gradient and world thunderstorm activity is based on the mean temporal fluctuations' coordination of the two quantities. Proof for the dependence is still lacking in single instances because the determination of the world thunderstorm activity is still connected with difficulties. In this report we try to compare the figures of the spherics at the time of the highest activity of Central American thunderstorm activity and their variations from one night to the next as measured in Aurich with the undistrubed potential gradient that was measured on the Pacific and in the high Alpine stations.

Deutscher Wetterdienst, Aachen (West Germany).
MEASUREMENTS OF SOLAR RADIATION IN THE SWISS ALPS, by H. Israël and G. Israël. Technical note no. 15 on Contract AF 61(514)640, 1 May 57, 75p. 13 refs. AFCRC TN-58-434; AD-152 605.
Order from LC mi$4.50, ph$12.30 PB 137 364

The results are given of the measurements of direct solar radiation in different spectrum ranges carried out during the "Alps Project" at the stations of Jungfraujoch, Gornergrat, and Payerne in the months of January to September 1955 and on the turbidity values (turbidity factors) deducted from them. The results of the radiation measurements have been compared with earlier measurements at the same location resp. in its close environment. As a supplement to the, determinations of the vapour turbidity according to VOLZ (turbidity type and aureole type) are communicated. Since measurements could not be made of the solar radiation at the station of Isole di Brissago, the results of the Osservatorio Meteorologico Ticinese, Locarno-Monti were used.

Deutscher Wetterdienst, Aachen (West Germany).
EXAMPLES FOR A SYNOPTICAL EVALUATION OF THE MEASURING RESULTS OF FOUR ATMOSPHERIC ELECTRIC STATIONS IN SWITZERLAND. by H. Dolezalek. Technical note no. 16 on Contract AF 61(514)640. 15 Aug 57, 42p. 13 refs. AFCRC-

TN-58-435; AD-152 606.
Order from LC mi$3.30, ph$7.80 PB 137 365

Some initial results in a new field of the systematic atmospheric electric synopsis by means of the measuring material of the Alps Project are reported. The foundations of the synoptic work in atmospheric electricity and the results to be expected are discussed. Some examples are chosen to illustrate the possibilities of this method, and consequences for atmospheric electric synoptic measuring programs are deducted from it.

California U., Los Angeles.
SUBTROPICAL PACIFIC METEOROLOGY PROJECT, by M. Neiburger. Final rept. on Contract N6onr-275(14). 30 Sep 58, 35p.
Order from LC mi$3.00, ph$6.30 PB 142 354

Analysis of cruise data made on three two-week cruises in summer of 1949, three two-week cruises in summer of 1950 and approximately at monthly intervals for 1951-1952.

California U. [Berkeley].
DESERT FLOOD CONDITIONS IN THE WHITE MOUNTAINS OF CALIFORNIA AND NEVADA, by John E. Kesseli and Chester B. Beaty. Rept. on Contract DA 19-129-qm-565. Apr 59, 114p. 24 refs. Technical rept. EP-108.
Order from LC mi$6.00, ph$18.30 PB 142 044

Three physiographic characteristics were found to influence flooding behavior in a desert stream system: (1) profile of the trunk canyon, (2) amount of debris on the floor of the canyon, and (3) width of the lower canyon and canyon mouth. It is concluded that the most dangerous canyons are essentially steep, narrow, bedrock flumes with 5 to 15 feet of unconsolidated debris on their floors. In contrast, the safest drainages have gentle gradients in their trunk canyons, are deeply alluviated over their entire length, and are characterized by wide lower canyons. The area of greatest flooding danger on an alluvial fan was found to be that flanking and including the active channel. The upper and lower thirds of a fan are classified as moderately dangerous, while the middle third is subject only to slight flood danger.

Air Weather Service, Scott AFB, Ill.
AN ERROR ANALYSIS OF GEOSTROPHIC 300-MB NUMERICAL WIND-SPEED FORECASTS, by Walter J. Saucier. Sep 58, 7p. AWS Technical rept. 105-148.
Order from LC mi$1.80, ph$1.80 PB 142 361

To summarize the individual forecast-speed errors, the grid area was divided into bands of every ten degrees of latitude. The average forecast-speed error for the eight days of data was then determined from all the forecast-speed errors within each 10^{o} latitude band. These results are shown. While this study employed only eight days of data, it is believed that the results are representative of summertime conditions. Just as with subjective forecasts, one would expect the forecast-speed errors to be larger in winter. However, it is not possible to state with assurance whether the percentage wind-speed error would be greater or less in winter than in summer.

Geodesy

Army Map Service, Washington, D. C.
STATISTICAL AND HARMONIC ANALYSIS OF GRAVITY. Mar 59, 45p. 39 refs. Technical rept. no. 24.
Order from LC mi$3.30, ph$7.80 PB 142 102

Markov theory is developed in terms of two correlated functions, the free air gravity anomaly and the elevation of the topography. A general evaluation of results and comparison with other studies are given, and techniques of application suggested.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NUMERICAL ORIENTATIONS OF A STRIP OF THIRTY SIMULATED PHOTOGRAPHS, by Edna L. Lortie. Mar 59, 35p. 3 refs. Memo. rept. no. 1145.
Order from LC mi$3.00, ph$6.30 PB 142 009

In order to facilitate the establishment of a universal code for the analytical solution of the general photogrammetric problem, the coordinates of 504 image points in 30 simulated photographs were computed. These photographs simulate a strip with 2/3 overlap taken over a simulated terrain. Thirty resections in space were computed providing an independent check on the mathematical rigidity of the solution. Random measuring errors were then applied to the computed plate coordinates and the 30 resections repeated, resulting in the most probable orientations and residuals.

National Bureau of Standards, Washington, D. C.
TABLES OF MEDIAN HOURLY VALUES OF THE COSINE OF THE SOLAR ZENITH ANGLE (χ) FOR THIRTY-FIVE LOCATIONS, by R. E. McDuffie. Feb 59, 39p. Technical note no. 5.
Order from OTS $1.25 PB 151 364

Naval Photographic Interpretation Center, Washington, D. C.
EXPLICIT FOUR-POINT RESECTION IN SPACE, by E. L. Merritt. 30 Sep 49, reprinted Aug 58. 18p. 4 refs. Rept. no. 118-49.
Order from LC mi$2.40, ph$3.30 PB 142 447

Naval Photographic Interpretation Center, Washington, D. C.
EXPLICIT THREE-POINT RESECTION IN SPACE, by E. L. Merritt. 25 Aug 49, 28p. Rept. no. 112-49.
Order from L C mi$2.70, ph$4.80 PB 142 444

Naval Photographic Interpretation Center, Washington, D. C.
EXPLICIT THREE-POINT RESECTION IN SPACE:

ANNEX I, by E. L. Merritt. 30 Nov 49, 10p. Rept. no. 122-49.
Order from LC mi$1.80, ph$1.80 PB 142 448

See PB 142 444

Naval Photographic Interpretation Center, Washington, D. C.
A NUMERICAL INVESTIGATION TO DETERMINE THE COMPUTATIONAL SENSITIVITY OF THE EXPLICIT THREE-POINT RESECTION IN SPACE, by J. A. Kowalski. 25 Apr 51, 6p. Rept. no. 112-51.
Order from LC mi$1.80, ph$1.80 PB 142 446

Naval Photographic Interpretation Center, Washington, D. C.
PHOTOGRAMMETRIC ANALYSIS OF IMAGE MOTION COMPENSATION, by G. T. McNeil. 28 May 51, 15p. Rept. no. 120-51.
Order from LC mi$2.40, ph$3.30 PB 142 104

The purpose of this report is to conduct a theoretical photogrammetric analysis of image motion compensation. The salient subjects to be considered are, the movement of the principal point, image movement (blur) resulting from points being located above or below the synchronized datum, and image movement (blur) resulting from a lack of mechanical synchronization between the film and ground planes.

Naval Photographic Interpretation Center, Washington, D. C.
PHOTOGRAMMETRIC CONTROL EXTENSION BY ANALYTICAL MEANS, by Everett L. Merritt. 20 Apr 51, 8p. 2 refs. Rept. no. 110-51.
Order from LC mi$1.80, ph$1.80 PB 142 443

Naval Photographic Interpretation Center, Washington, D. C.
TILT BY THE DIVIDED BASE LINE METHOD, by G. T. McNeil. 15 June 50, 7p. 1 ref. Technical Bulletin no. 109-50.
Order from LC mi$1.80, ph$1.80 PB 142 442

A numerical example is outlined to determine graphically the tile and swing of a photographic exposure. The required given data are: (a) Focal length of camera, (b) Fiducial marks to locate principal point, and (c) Two bisected base lines at equal elevation.

Naval Photographic Interpretation Center, Washington, D. C.
TILT BY THE DIVIDED BASE LINE METHOD--ANNEX I, by E. L. Merritt. 15 June 50, 4p. Technical Bulletin no. 112-50.
Order from LC mi$1.80, ph$1.80 PB 142 445

See PB 142 442

Naval Research Lab., Washington, D. C.
ROCKET RESEARCH REPORT NO. XXI. PHOTOGRAPHY FROM THE VIKING 12 ROCKET AT ALTITUDES RANGING UP TO 143.5 MILES, by R. C. Baumann and L. Winkler. Final rept. 22 Apr 59, 36p. NRL rept. 5273.
Order from LC mi$3.00, ph$6.30 PB 138 244

On February 4, 1955, Viking 12 was launched at White Sands Proving Ground, New Mexico. The research equipment in the rocket included an aircraft camera which took 53 pictures at altitudes varying from 97.7 miles on the ascent, through the peak of 143.5 miles, to 87.6 miles on the descending portion of the trajectory. Excellent definition was obtained on all of the photographs. The photographs cover the area of the United States and Mexico to the west of WSPG. The curvature of the earth, the atmospheric layer, rivers, lakes, railroads, the Gulf of California, Lower California, the Pacific Ocean, clouds, snow-covered mountain peaks, and "smog" over Los Angeles are some of the easily distinguishable features on the photographs. Matching maps have been drawn for some of the photos to permit ready identification of pertinent geographical features. (See also PB 129 025)

Physics of the Atmosphere

Michigan U. Research Inst., Ann Arbor.
PAPERS PRESENTED AT CSAGI MEETING, MOSCOW, RUSSIA, JULY 30- AUGUST 9, 1958. Scientific rept. no. ES-2 on Contract AF 19(604)1948. Sep 58, 21p. 9 refs. 2597-6-S; AFCRC TN-58-618.
Order from LC mi$2.70, ph$4.80 PB 142 434

Paper 1: A Radioactive-Ionization-Gauge Pressure-Measurement System. Paper 2: Pressure, Temperature, and Density to 90 km over Fort Churchill.

Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins U., Baltimore.
BALLOON OBSERVATIONS OF EARTH RADIATIONS IN THE INFRARED. II, by John Strong. Scientific rept. no. 1 on Contract AF 19(604)2238. 7 Oct 58, 21p. 1 ref. AFCRC TN-58-608.
Order from LC mi$2.70, ph$4.80 PB 139 471

On November 26 and December 10, 1957 two balloon flights were made to measure the up minus down infrared radiation field in the upper air. A fraction of a micron spectral resolving power was achieved. Variation of this measured quantity with height (indicating divergence of flux) was determined but most of the observations were recorded at 90 K feet altitude. The analysis of the data indicates the equipment can be modified to overcome certain deficiency in calibration and measure divergence of flux precisely on its next flights. The determinations of radiation field spectrum at 90 K feet agree satisfactorily for the two flights.

Ionosphere Research Lab., Pennsylvania State U., University Park.
RELAZATION TIME OF THE IONOSPHERE, by A. P. Mitra. Scientific rept. no. 119 on Ionospheric Research, Contract AF 19(604)3875. 1 Apr 59, 39p.

17 refs. AFCRC-TN-59-265; AD-213 238.
Order from LC mi$3.00, ph$6.30 PB 142 199

A generalized study of relaxation time phenomenon comprizes the subject of interest of this report. A new model, based on extensive experimental data, is deduced and is related to the physical considerations involved. Temporal and latitudinal variations are included in this study to the extent possible. The report is concluded with a discussion concerning several related phenomena.

Ionosphere Research Lab., Pennsylvania State U., University Park.
PRELIMINARY THEORY AND INTERPRETATION OF LONG-WAVE SWEEP-FREQUENCY RECORDS, by C. F. Sechrist, Jr. Scientific rept. no. 115 on Ionospheric Research, Contract AF 19(604)3875. 1 Feb 59, 103p. 35 refs. AFCRC-TN-59-279; AD-214 890.
Order from LC mi$5.70, ph$16.80 PB 142 198

A study and elucidation is made of complex low frequency ionograms. The following major factors are covered: (1) a summarization of the low frequency sweep results published, (2) a compilation of the relevant low frequency theoretical work, and (3) the presentation and qualitative interpretation of certain of the low frequency ionograms procured in the laboratory.

Electrical Engineering Research Lab., U. of Texas, Austin.
ANALYSIS TECHNIQUES INVOLVED IN A STUDY OF TURBULENCE SPECTRA NEAR THE GROUND, by F. X. Bostick, Jr., H. W. Smith, and C. E. McCullough. Rept. on Contract AF 19(604)2249. 31 Mar 59, 81p. 8 refs. Rept. no. 6-27; AFCRC-TN-59-176; AD-214 422.
Order from LC mi$4.80, ph$13.80 PB 142 201

A research program designed to study the micro fluctuations of temperature in the turbulent atmosphere near the ground has been undertaken. It is intended that the program soon be expanded to include simultaneous studies of refractive index fluctuations.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
FLIGHT INFORMATION AND EXPERIMENTAL RESULTS OF NIKE-CAJUN ROCKET OB6.00, by Spence T. Marks, Frederick H. Poughkeepsie and others. Upper Atmosphere Research rept. no. 1. 85p. 12 refs. Memo. rept. no. 1200.
Order from LC mi$4.80, ph$13.80 PB 142 008

The history of a Nike-Cajun rocket firing to determine the suitability of the rocket for a variety of research experiments in connection with the International Geophysical Year Program is related. Specific flight objectives are enumerated. Rocket units are listed. The mechanical layout and instrumentation of the nose cone are described. The performance of the rocket is discussed in detail. Experimental results obtained during the flight are given. Rocket performance and experimental results are compared with the results of theoretical studies with respect to rocket performance, rocket stability, skin temperatures of the nose cone, and electron densities in the ionosphere.

Air Force Cambridge Research Center, Bedford, Mass.
PROCESSES FOR THE PRODUCTION AND REMOVAL OF ELECTRONS AND NEGATIVE IONS IN GASES, by S. M. Silverman. June 59, 24p. 46 refs. GRD Research notes no. 16; AFCRC-TN-59-266; AD-216 816.
Order from OTS $0.75 PB 151 930

A survey is presented of the more important processes which are responsible for the production and removal of electrons and negative ions in the earth's atmosphere An attempt is made to include references to all recent work on these processes and to indicate those areas in which additional work needs to be done.

ENGINEERING

Pennsylvania State U., University Park.
HEAT TRANSMISSION TESTS ON INSULATED STEEL AND ALUMINUM DECK PANELS, by E. R. McLaughlin. Rept. on Contract NObs-72266. 26 June 57, 39p. AD-140 606.
Order from LC mi$3.00, ph$6.30 PB 142 336

Heat transmission tests were made on an aluminum and a steel deck panel insulated with fibrous glass insulation. The test panels were of 3/16 in. plate 67.5 in. square. Because of the complex nature and large size of the builtup panels, heat transfer measurements were made by the guarded hot box method. Tests were made by the guarded hot box method. Tests were made with the beam flanges unpainted and painted. Each panel was tested under 2 conditions with deck surface temperatures of 14° and 120°F. Heat transfer coefficients are presented as graphs.

[Army] Engineer Research and Development Labs., Fort Belvoir, Va.
FLAMMABILITY LIMITS OF HYDROGEN FROM 100-760 MM MERCURY PRESSURE AND THE EFFECT OF THREE HALOGENATED HYDROCARBONS ON THE FLAMMABILITY LIMITS OF HYDROGEN AT 500 AND 760 MM MERCURY PRESSURE, by George J. Esseff and Kenneth P. Quinlan. 3 June 55, 54p. 31 refs. Rept. no. 1410.
Order from LC mi$3.60, ph$9.30 PB 142 178

This report covers the determination of the flammability limits of hydrogen and air, using upward flame propagation initiated by electric discharge, in a 50-mm diameter glass, pyrex tube with system pressures of from 100 to 760 mm and at normal temperature; and the evaluation of the effect of three halogenated hydrocarbons as inhibitors on the flammability of hydrogen. The halogenated hydrocarbons used were bromotrifluoromethane (Halon 1301), dichlorodifluoromethane (Freon 12) (Halon 122) and methyl bromide (Halon 1001). The three-component system (air-hydrogen-inhibitor) was investigated within the flammability limits of hydrogen-air mixtures at 500 and 760 mm.

Wichita U. School of Engineering, Kans.
TWO-DIMENSIONAL CIRCULATION CONTROL TESTS ON AN NACA 23015 AIRFOIL EQUIPPED WITH A SEALED AND SLOTTED FLAP TO DETERMINE JET MOMENTUM LOSS OVER THE FLAP, by D. L. Cruse and P. E. Morris. May 58, 173p. 7 refs. Engineering rept. no. 311; FAMD rept. no. R246A-003.
Order from LC mi$8.10, ph$27.30 PB 142 036

A two-dimensional wind tunnel program was conducted on an NACA 23015 airfoil equipped with a 25% chord flap and blowing circulation control to determine the jet momentum loss over the flap. This program was an extension of the tests described in Reference 6. Two flap configurations were tested; a sealed flap and a slotted flap. Each configuration was run through a range of jet velocity to tunnel free-stream velocity ratios from the minimum required to attach the flap to the maximum attainable, which was about 12. The slotted flap configuration was tested at 0 degrees flap deflection and blowing jet widths of .15 and .9 percent of the model chord. The sealed flap configuration was tested at flap deflections of 0, 30, 60 and 70 degrees and a blowing jet width of .9 percent of the model chord. Aerodynamic and circulation control mass-flow data were taken and total and static pressure profiles were measured across the blowing jet and at the flap trailing edge.

Syracuse U. Research Inst., N. Y.
MATERIALS IN SPACE ENVIRONMENT. PROCEEDINGS OF THE SAGAMORE ORDNANCE MATERIALS RESEARCH CONFERENCE [NO. 5] CONDUCTED AT SAGAMORE CONFERENCE CENTER, RACQUETTE LAKE, NEW YORK, SEPTEMBER 16, 17, 18 AND 19, 1958. Rept. on Contract [DA] 30-115-ORD-947. [1958] 276p. 123 refs. METS97-596.
Order from OTS $4.00 PB 151 900

Contents:
Session 1: Space environment and vehicle requirements
Session 2: Physics of space vacuum and effects on materials
Session 3: Thermal problems under orbiting conditions
Session 4: Radiation and radiation effects in outer space
Session 5: Meteorites and cosmic dust in space
Session 6: Implications of space environment for material development

Sperry Gyroscope Co., Great Neck, N. Y.
FEASIBILITY STUDY: AUTOMATIC OPTIMIZING STABILIZATION SYSTEM, PART I, by S. S. Osder and I. N. Hutchinson. Final technical rept. for May 57-May 58 on Contract AF 33(616)5075. June 58. 121p. 16 refs. Sperry rept. no. 3265-3746, pt. 1; WADC TR-58-243, pt. 1; AD-155 576.
Order from LC mi$6.30, ph$19.80 PB 142 151

This report summarizes the work accomplished on a program to evaluate the feasibility of an automatic optimizing stabilization system for supersonic or hypersonic vehicles operating within a planetary atmosphere and in the transition regime encountered in exit and re-entry maneuvers. The system investigated continuously detects stability boundaries and adjusts automatic flight control system gains to within a desired margin of these boundaries. The required adjustments are determined by extracting the essential information from the vehicle-autopilot closed loop impulse response. Periodic low amplitude excitation impulses are applied to the system with a Performance Computer establishing the required adjustments on the basis of monitored response. Adaptive stabilization and maneuvering configurations for a variety of vehicles were obtained in analog computer studies including physical equipment mock-ups. The Performance Computer was also used to provide automatic cross-over between reaction jet and aerodynamic controls during exit and re-entry maneuvers. A proposed follow-on program for evaluating system techniques in a modified supersonic fighter aircraft operating at extreme altitude and equipped with reaction-jet controls is described.

Pennsylvania State U., University Park.
A STUDY OF TURBINE PERFORMANCE IN A NON-STEADY FLOW FIELD, by D. F. White. Doctoral thesis. Technical rept. on Contract Nonr-656(16). Aug 58, 111p. 6 refs.
Order from LC mi$6.00, ph$18.30 PB 142 226

The performance of a single stage axial flow turbine which is supplied with energy in the form of finite-amplitude gas pressure waves was analyzed theoretically and experimentally. The analytical procedures are based on the method of characteristics, and theoretical solutions can be obtained by means of a high-speed digital computor. Experimental data on turbine performance show excellent agreement with theoretical predictions.

Office of Scientific Research and Development. Div. 14.
MOVING TARGET INDICATION ON MEW, by A. G. Emslie. (Radiation Lab., Mass. Inst. of Tech.). Rept. on Contract OEMsr-262. 19 Feb 46, 22p. 3 refs. Radiation Lab. rept. 1080.
Order from LC mi$2.70, ph$4.80 PB 142 060

The MEW/MTI project was undertaken to make the set site-free and thereby increase its efficiency in handling air traffic. A scanning analysis showed that the ground clutter would fluctuate by as much as 10% from pulse to pulse due to the small number of pulses per beam width. These fluctuations were removed by limiting in the IF, leaving only the phase variations, which are independent of clutter amplitude. The cancellation involves a 3300 microsecond supersonic delay line whose temperature drift is compensated for by using an identical delay line as the timing element in the trigger generator. In the tests at Bedford all ground clutter was cancelled, including some that measured 60 db above noise. Indirect measurement showed that a plane 28% as large as the clutter could be seen in the clutter. The addition of MTI caused a 15% reduction in range due to blind speeds.

Naval Research Lab., Washington, D. C.
SOME PROBABILITY ASPECTS OF THE AIRCRAFT COLLISION PROBLEM, by P. J. LaRochelle and R. E. Brescia. Interim rept. 30 Apr 59, 46p. 10 refs. NRL rept. 5289.
Order from OTS $1.25 PB 151 556

Given adequate data, air space segregation by ground control or airborne observation and local control can minimize collision hazard. The probabilities of data accuracy must be considered because of the physical nature of data sources. Data error distribution has been analyzed both before and after smoothing to determine the theoretical order of improvement in reliable prediction of minimum miss distances. The effects of smoothing methods were investigated in order to sample the changes in calculated confidence intervals of prediction errors. It was found that the data from presently available navigation devices may be used to reliably determine air collision hazards provided suitable smoothing techniques are utilized. The use of coding and redudancy will allow many aircraft to exchange data on a radio frequency channel with a high degree of reliability.

National Aeronautical Establishment (Canada).
A WING-SUBMERGED LIFTING FAN: WIND TUNNEL INVESTIGATIONS AND ANALYSIS OF TRANSITION PERFORMANCE, by R. L. Wardlaw and N. V. McEachern. Apr 59, 79p. 4 refs. Aeronautical rept LR-243.
Order from LC mi$4.50, ph$12.30 PB 142 414

Wind tunnel force measurements have been carried out on a wing-fan combination; the high solidity fan was embedded in a two-dimensional symmetrical wing, with the fan axis normal to the wing chordplane. Results are discussed and compared with a simple momentum theory, with a view to their usefulness in VTOL project studies. Over a limited range, fan power and model force measurements provide reasonable correlation with theoretical predictions. An understanding of the flow in the vicinity of the fan is facilitated by surface pressure measurements and water tunnel flow visualization studies.

National Aeronautical Establishment (Canada).
A PRELIMINARY ANALYSIS OF THE PENALTIES ASSOCIATED WITH PIERCING A WING TORSION BOX WITH A GRID OF HOLES, by A. H. Hall. 1 Jan 59, 18p. 5 refs. Laboratory rept. LR-236.
Order from LC mi$2.40, ph$3.30 PB 142 418

This analysis relates to a conventional aircraft that is modified by the addition of fans housed in the wing plane to provide means for vertical take-off and landing. The influence of a grid of holes in the wing torsion box, on top level speed, is inferred by the torsional stiffness criterion for wing divergence. The probable weight penalty incurred in restoring the stiffness to its original, or an intermediate value, is estimated.

National Aeronautical Establishment (Canada).
NOTES ON HALF MODEL TESTING WIND TUNNEL, by J. A. van der Bliek. Jan 59, 37p. 39 refs. Lab. rept. LR-235.
Order from LC mi$3.00, ph$6.30 PB 140 984

A short review is given of the effects associated with half model technique in wind tunnel testing. These include tunnel wall boundary layer and gap between model and tunnel wall. Reflection plane configurations are considered. Some experimental data on comparison between full and half model tests are given.

National Aeronautical Establishment (Canada).
NOTE ON THE MINIMUM POWER REQUIRED FOR FLIGHT AT LOW AIRSPEEDS, by R. J. Templin. 21 May 59, 28p. 4 refs. Aeronautical rept. LR-245.
Order from LC mi$2.70, ph$4.80 PB 142 417

An idealized form of aircraft, having a lifting wing and a jet or slipstream issuing at an angle to the flight direction so as to product lift and thrust, is considered. The power required to produce the kinetic energy of the jet is calculated for all flight speeds down to zero. For sustained level flight at any speed there is an optimum wing lift coefficient for minimum power. In some cases, the achievement of optimum lift may require circulation control. Since the idealized aircraft roughly represents a number of proposed types of VTOL and STOL aircraft, some general conclusions are possible concerning the power required by such aircraft in low speed flight.

National Aeronautical Establishment (Canada).
DRAG MEASUREMENTS ON AGARD MODEL "A" IN THE N. A. E. 30-X 16-INCH WIND TUNNEL AND COMPARISON WITH OTHER DATA, by J. A. van der Bliek. Nov 58, 18p. 16 refs. Lab. rept. LR-233.
Order from LC mi$2.40, ph$3.30 PB 140 983

The zero-lift drag was measured on the AGARD standard model 'A' at Mach numbers from 0.4 to 2.0 and at Reynolds numbers from 2.5 to 4.8 x 10^6. Both the full model and the half model techniques were used. Comparisons were made with other experimental results. The friction drag was shown to be related to the transition Reynolds number measured on a 10-degree cone.

National Aeronautical Establishment (Canada).
BOUNDARY LAYER TRANSITION ON A 10-DEGREE CONE IN THE N. A. E. 30-X 16-INCH WIND TUNNEL, by J. A. van der Bliek. Nov 58, 16p. 8 refs. Lab. rept. LR-232.
Order from LC mi$2.40, ph$3.30 PB 140 982

Transition Reynolds numbers were determined on a 10-degree cone, mounted in the 30- x 16-inch wind tunnel. The transition Reynolds number was between 2.3 and 3.3 x 10^6.

Mississippi State Coll., State College.
DISTRIBUTED SUCTION BOUNDARY LAYER CONTROL ON CONICAL DIFFUSERS, by I. Man Moon. Research rept. no. 17 on Contract Nonr-978(01). 11 Aug 58, 74p. 30 refs.
Order from LC mi$4.50, ph$12.30 PB 142 391

This investigation of 30° conical diffusers of an area ratio of 3.36 with perforated suction boundary layer control leads to the following conclusions: The transformation efficiency of the diffusers is directly related to the inlet momentum thickness of the boundary layer. The necessity for a uniform inlet profile is reemphasized by this research. Methods for correcting the inlet profile, consisting of honeycomb and screens, introduce a large flow loss. Therefore other approaches should be attempted. High turbulence in the diffuser flow results in a considerable decrease in the efficiency.

Minnesota U., Minneapolis.
BIBLIOGRAPHICAL REVIEW OF PANEL FLUTTER AND EFFECTS OF AERODYNAMIC NOISE, by J. V. Rattayya and L. E. Goodman. Rept. for Aug-Nov 58 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5426. June 59, 42p. 215 refs. WADC Technical rept. 59-70; AD-215 448.
Order from OTS $1.25 PB 151 890

A critical review.

Flight Control Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
PROCEEDINGS OF THE SELF ADAPTIVE FLIGHT CONTROL SYSTEMS SYMPOSIUM, by P. C. Gregory, Ed. Rept. for 13-14 Jan 59, 470p. 37 refs. WADC-TR-59-49; AD-209 389.
Order from LC mi$11.10, ph$71.10 PB 142 243

Papers presented described the "state of the art" of adaptive control systems. Various self adaptive control philosophies and the mechanization and flight test of these philosophies are presented. Future plans and programs for self adaptive systems are discussed. Individual conclusions reached indicate that present flight control systems in operational vehicles could have a self adaptive capability.

Bureau of Yards and Docks, Washington, D. C.
AIRFIELD PAVEMENT. 1 Jan 53, 103p. 61 refs. Technical pub. NAVDOCKS TP-Pw-4.
Order from OTS $2.50 PB 151 617

Booz, Allen and Hamilton, Chicago, Ill.
ATMOSPHERIC CONTAMINANT, RADIATION, AND ELECTRICITY CRITERIA FOR AIRCRAFT AND AIRBORNE EQUIPMENT, by C. Frank Riley, Jr. and Paul F. Walker. Rept. no. 7 on Environmental Criteria for Aircraft and Airborne Equipment, Contract AF 33(616)2689. June 55, 130p. 89 refs. WADC Technical note 55-118; AD-92 498.
Order from LC mi$6.30, ph$19.80 PB 142 258

The characteristics, distribution of occurrence, effects on aircraft and equipment and preventive measures for various less troublesome environmental factors are presented in this report. The factors covered are static electricity, lightning, sand and dust, solar radiation, ozone, cosmic radiation, noise, insects, explosive atmospheres and nitric acid fumes.

Bolt, Beranek and Newman, Inc. [Cambridge, Mass.]
INTRUSION OF AIRCRAFT NOISE INTO COMMUNITIES NEAR TWO USAF AIR BASES, by W. E. Clark and A. C. Pietasanta. Rept. on Investigation and Control of the Acoustic Characteristics of Air Force Noise Sources, Contracts AF 33(616) (3335, 3938). Feb 59, 237p. 26 refs. WADC Technical note 58-213; AD-212 223.
Order from OTS $3.50 PB 151 822

This report describes the field studies that have been performed to provide experimental data on noise intrusion into community areas from aircraft flight operations. Air traffic activity over selected community areas in the vicinity of two bases was determined from analysis of air base flight movements and from field observations. Flight paths, pattern altitudes, climb profiles and engine power changes were determined from aircraft tracking observations, from interrogation of flight and operations personnel and from special logs prepared by crew members on aircraft in flight. Noise from flyovers observed at ground locations was recorded in synchronization with position data.

Battelle Memorial Inst. [Columbus, Ohio].
THE DEVELOPMENT OF OSCILLATORY ROLLING-CONTACT BEARINGS FOR AIRFRAME APPLICATIONS IN THE TEMPERATURE RANGE 300F TO 600F, by William A. Glaeser, C. Malcolm Allen and others. Rept. on Contract AF 33(600)34097. Mar 59, 104p. 3 refs. WADC Technical rept. 59-145; AD-213 594.
Order from OTS $2.50 PB 151 909

A total of 1080 aircraft-type roller bearings have been evaluated under oscillating conditions over a temperature range from 300 F to 600 F. Three bearing materials, two bearing designs, two oscillation amplitudes, and a number of high-temperature greases were investigated. Load-life charts with 95% confidence limits have been established from a statistical analysis of the data. Metallographic analysis of failed bearings has revealed some high-temperature-bearing-failure mechanisms.

Army Transportation Research and Engineering Command, Fort Eustis, Va.
DETERMINATION OF THE NORMAL COMPONENT OF INDUCED VELOCITY IN THE FLOW FIELD OF A UNIFORMLY LOADED LIFTING ROTOR HOVERING IN GROUND EFFECT BY USE OF AN ELECTRO-MAGNETIC-ANALOG, AND A METHOD FOR UTILIZING THIS INFORMATION TO STUDY INTERFERENCE-INDUCED VELOCITIES FOR MULTIROTOR HELICOPTERS, by Grayson D. Tate, Jr. (Georgia Inst. of Tech. Master's thesis). Apr 59, 56p. 3 refs. Research technical memo. RTM 26; AD-209 523.
Order from LC mi$3.60, ph$9.30 PB 142 082

Approximate values are given of the normal component of the induced velocities in the vicinity of a single uniform vortex cylinder and its image. A method is also presented wherein the above values of induced velocity are used to study the distribution of interference-induced velocities for multirotor helicopters. This

information is shown in the form of tables and graphs and was determined by measuring the magnetic field strength about an electromagnetic-analogy model of the wake vortex system.

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ALLOWABLE STRESSES IN AIRCRAFT AND MISSILE STRUCTURES AT ELEVATED TEMPERATURES, by B. E. Gatewood. Rept. on Construction Techniques and Application of New Materials. July 56, 64p. 137 refs. WADC TN-56-380; AD-97 230.
Order from LC mi$3.90, ph$10.80 PB 142 041

The particular allowable stresses considered in detail are the buckling, column, and crippling stresses of thin sheet metal structure. Procedures are given for comparing different materials under given loading and type of structure. For thin sheet metal structure in compression, not only the temperature and load must be considered but also the geometry of the cross-section.

Aerophysics Development Corp., Santa Barbara, Calif.
INSULATION STUDY FOR AIRFRAME STRUCTURES by Gibson Oakes. Rept. for 15 Apr 57-15 Apr 58 on Aircraft Structural Research at Elevated Temperatures, Contract AF 33(616)5152. Apr 58, 151p. 21 refs. WADC Technical rept. 58-131; AD-151 108.
Order from OTS $2.75 PB 151 618

A bibliography is presented with abstracts pertinent to the study of airframe structures insulation. The properties and characteristics of three types of insulation are discussed. These types are: blanket or fill, molded plastic and ceramic insulation. The heating rates of structures with and without insulation are compared and the transient thermal response of airframe structures is evaluated. An expression is derived which determines the variation of material yield strength with temperature and this expression is then utilized to define an optimum insulation thickness. Discussion is presented on the use of a hydraulic analog for obtaining the thermal response of a structure. Molded plastic type insulation is analytically examined to determine the amount of time prior to initiation of ablation and the velocity of ablation. The use of ceramic insulation as a radiation shield is discussed and an expression for the limiting rate of surface temperature rise of a ceramic flat-plate is derived.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
LIGHT-WEIGHT SEATING: DESIGN RESEARCH AND DEVELOPMENT OF A NET SEAT FOR PROJECT MANHIGH: ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS, by John H. Duddy (Tufts U.) and Charles A. Dempsey. Rept. on Biophysics of Space Flight, Contract AF 33(616)3068. Dec 58, 50p. 9 refs. WADC Technical rept. 58-307; AD-206 922.
Order from OTS $1.25 PB 151 787

This report describes the design research and development of a lightweight nylon net seat for Project MANHIGH. Experiments were conducted to determine the ways in which the complex contours of a continuous body supporting surface could be generated with nylon net. Three independent factors were found to affect the curvature of the surface: (1) the contour of the sidewalls supporting the net, (2) the distance between the sidewalls, and (3) the tension of the net. These factors were varied empirically to develop an experimental seat design for submission to the Project MANHIGH contractor. Contractor forces developed an aluminum and nylon net facsimile of the proposed seat for installation in the Project MANHIGH balloon gondola. An evaluation of the seat was conducted by the pilot during OPERATION MANHIGH II. Results suggest that a continuous body supporting surface of nylon net is capable of satisfying the human factors requirements of a seat for prolonged endurance.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
AIRBORNE EQUIPMENT FOR RECORDING AIRCRAFT FLIGHT PATHS, by John C. Simons and William H. Richardson. Rept. on In-Flight Human Engineering Studied on Displays and Control Systems. June 58, 39p. 5 refs. WADC Technical note 58-37; AD-131 058.
Order from LC mi$3.00, ph$6.30 PB 142 007

The Aero Medical Human Factors Airborne Laboratory, C-131B 53-7823, has been equipped to continuously record pitch, bank, heading, altitude, airspeed and other flight path parameters. This report reviews the capability and reliability of the recording systems and establishes general operating and calibrating procedures for the equipment. A general description of the systems research capability including methods of scoring, data reduction and experimental controls is given.

Chemical Engineering

Bureau of Yards and Docks, Washington, D. C.
BIOLOGICAL WARFARE DEFENSE. Revised 15 Apr 53, reprinted 1 Sep 53, 124p. Technical pub. NAVDOCKS TP-PL-4.
Order from LC mi$6.30, ph$19.80 PB 142 362

This the third in a series of publications on Passive Defense and Damage Control. It is intended to serve as a guide to naval shore activities in developing adequate protective and decontamination measures against biological warfare, and to assist the Civil Engineer Corps Officer in carrying out his assigned mission in biological warfare defense. In developing defenses for naval stations, biological warfare has not been considered as an absolute weapon capable of disabling or destroying large portions of a community. On the other hand, it would be dangerous to consider it as an impractical weapon that presents no danger. Adequate preparation should be made to minimize the effects in case an attack is made.

George Herbert Jones Chemical Lab., U. of Chicago, Ill.
PURIFICATION AND STABILIZATION OF NITRIC

ACID BY OZONIZATION, by A. A. Krawetz and T. F. Young. Technical rept. no. 4 on Contract N6ori-02045. 20 Aug 58, 7p. 5 refs.
Order from LC mi$1.80, ph$1.80 PB 140 968

Consideration of the thermal decomposition as an equilibrium has lead to a satisfactory solution. Addition of about 3 to 5% of NO_2 and about the same percent of water to 100% nitric acid represses the pressure of O_2 sufficiently. Experimental observations are here reported which demonstrate (1) that ozonization can remove the products of decomposition of aqueous solutions of nitric acid without introducing objectionable impurities and (2) that the purified product retains residual resistance to decomposition for extended periods subsequent to ozonization. The gaseous products of the decomposition of nitric acid could also be removed by the passage of a stream of inert gas through the liquid. The process to be described is suggested as a more useful treatment.

Naval Research Lab., Washington, D. C.
A NEW METHOD FOR DETERMINING THE DEGREE OF COMPATIBILITY OF DRY CHEMICAL POWDERS WITH MECHANICAL FOAMS, by E. J. Jablonski and R. L. Gipe. Final rept. 23 June 59, 21p. 18 refs. NRL rept. 5329.
Order from OTS $0.75 PB 151 734

New investigations have been made into the compatibility of fire-fighting dry chemical compounds and fire-fighting mechanical foams. A laboratory test for determination of the degree of compatibility of these materials has been devised to replace the outdoor fire test described in MIL-F-19563 (Aer). The new test, which eliminates the variable of weather, is an easily conducted bench procedure which can be carried out under controlled conditions. Comparative compatibility determinations were made with C. P. sodium bicarbonate, a commercial non-compatible powder, several commercial compatible powders, and the present JAN-C-266 foam concentrates. A powder is considered acceptable if the foam-drainage rate is not increased by more than a factor of two when it is used according to the prescribed test procedure. A wide difference was found between foam concentrates in their inherent ability to resist breakdown by the powders. Measurement of the pH of the drained solutions indicated that the ability of the solution to buffer the alkaline powders played an important role. In some instances the addition of powder increased the heat-resistance property of the foam. It is recommended that this test be used in lieu of the present test now described in MIL-F-19563 (Aer).

Picatinny Arsenal, Dover, N. J.
EVALUATION OF THE WATERBURY ("W") PROCESSES FOR MANUFACTURE OF GUANIDINE NITRATE, by H. M. Goldstein, K. H. Russell and L. W. Saffian. Apr 59, 23p. 10 refs. Technical rept. DB-TR:5-59.
Order from LC mi$2.70, ph$4.80 PB 142 219

Extensive previous studies had demonstrated the technical and economic feasibility of the Waterbury ("W") process for guanidine nitrate manufacture. This report summarizes results of studies conducted on laboratory, pilot plant, and production scales, aimed at establishment of the suitability of "W" guanidine nitrate for Ordnance use in terms of (1) its processing characteristics during conversion to nitroguanidine, (2) chemical and physical characteristics of the resultant nitroguanidine, and (3) ballistic performance of triple-base propellant formulations containing this nitroguanidine.

Weizmann Inst. of Science (Israel).
RESEARCH IN THE GENERAL FIELD OF EXCHANGE KINETICS: INVESTIGATION OF FAST PROTOLYSIS REACTIONS BY NUCLEAR MAGNETIC RESONANCE TECHNIQUE, by S. Meiboom, S. Alexander and others. Final technical rept. on Contract AF 61(052)03. July 58, 35p. 25 refs. AFOSR TR-58-110; AD-201 858.
Order from LC mi$3.00, ph$6.30 PB 142 163

The measurement of fast hydrogen exchange rates by the nuclear magnetic resonance technique is described. In the systems studied, the exchangable hydrogens are bonded either to nitrogen (amine and amide groups) or to oxygen (hydroxyl groups). In many cases, a complete analysis of the kinetics of the exchange reaction was studied in the following systems: (1) Aqueous solutions of ammonium chloride. (2) Aqueous solutions of N-methylacetamide. (3) Aqueous solutions of glycine, glycine methyl ester and sarcosine. (4) Proton transfer in water. (5) Aqueous solutions of hydrogen peroxide. (6) Ethanol - water mixtures. An improved spin-echo method for measuring relaxation times is described.

Civil Engineering

Stanford U., Calif.
INVESTIGATION OF SHEAR WALLS. PART II. CONTINUED STUDIES OF COMBINED NORMAL AND SHEAR LOAD, ULTIMATE RESISTANCE OF MULTI-STORY SHEAR WALL BENTS, AND RESISTANCE OF BRICK FILLER WALLS WITH OPENINGS, by Jack R. Benjamin, Harry A. Williams, and John A. Erickson. Technical rept. no. 9, 30 Sep 55-31 Dec 56, on Contract DA 49-129-eng-193. Dec 56, 48p. 10 refs. AFSWP 890; AD-145 421.
Order from LC mi$3.00, ph$7.80 PB 137 465

This report contains a portion of the results of research on shear wall behavior for the Corps of Engineers during the period September 30, 1955, to December 31, 1956. The following studies are included: A continuation of the study of reinforced concrete shear walls under combined normal and shear loading. A continuation of the study of the ultimate resistance of the first story shear wall of a multi-storied structure. A limited experimental investigation of brick filler wall construction.

Institute of Flight Structures, Columbia U., New York.
ON THE USE OF STRESS FUNCTIONS FOR HETEROGENEOUS MAXWELL BODIES, by Jerome L. Sackman. Technical rept. no. 6 on Contract Nonr-266(34). Sep 58, 55p. 28 refs. Rept. CU 6-58-ONR-266(34)-CE.
Order from LC mi$3.60, ph$9.30 PB 142 091

Two-dimensional problems of plane stress and plane strain in a linear Maxwell body with a heterogeneous coefficient of viscosity are formulated in terms of the Airy stress function. Attention is then restricted to the case of steady creep with the coefficient of viscosity varying exponentially in one of the coordinates in the plane. As an example the plane stress solution for the steady creep bending of a narrow rectangular beam is obtained and compared to the elementary solution. The existence of a (three-dimensional) true-plane stress solution for a thin plate stretched in its own plane is also investigated, and it is found that, in general, no such solution exists. By utilizing the three Maxwell stress functions, a series solution for this three-dimensional problem is formulated and applied to obtain the solutions of two particular examples.

Columbia U., New York.
ROADS OF MADAGASCAR, by William A. Hance. Rept. on Contract Nonr-266(29). [1958] 5p. 7 refs.
Order from LC mi$1.80, ph$1.80 PB 139 376

The dilemma of achieving an effective road system on this enormous island is that the level of the economy does not justify the expenditure that is necessary. Continued slow but gradually accelerating progress may be expected in road development.

Bureau of Yards and Docks, Washington, D. C.
WATERFRONT AND HARBOR FACILITIES. 1 Sep 54, 128p. 9 refs. Technical pub. NAVDOCKS TP-Pw-8.
Order from OTS $2.75 PB 151 614

Bureau of Yards and Docks, Washington, D. C.
BASIC STRUCTURAL ENGINEERING. 15 May 54, 132p. 4 refs. Technical pub. NAVDOCKS TP-Te-3.
Order from OTS $2.75 PB 151 615

Electrical and Electronic Engineering

Acoustics Research Lab., Harvard U., Cambridge, Mass.
A 25-MILLISECOND ELECTROMAGNETIC DELAY LINE, by W. Richard Stroh. Technical memo. no. 41 on Contract Nonr-1866(24). 5 Dec 57, 59p. 22 refs.
Order from LC mi$3.60, ph$9.30 PB 137 455

A low-pass filter delay line suitable for use in making correlation measurements at audio frequencies is described. The line provides a maximum delay of 25 milliseconds in 0.05 millisecond steps; the useful frequency range is 50 c/s to 4000 c/s. The design of the filter is conventional. To offset attenuation in the line and achieve the desired flat frequency characteristic, twenty-five low-gain, low-distortion amplifiers are inserted in the line. Performance data for the system are given. The possibility of using the line as a phase standard or phase divider is discussed.

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
AUTOMATIC COMPONENT ASSEMBLY SYSTEM. PHASE I AND PHASE II, by H. L. Heydt and Walter Hausz. Final engineering rept. for 1 July 55-1 Jan 56 on Contract DA 36-039-sc-30250. [1956] 23p.
Order from LC mi$2.70, ph$4.80 PB 142 222

The manufacture of all system components was completed. Overall system assembly, interconnection, and evaluation of integrated operation was accomplished.

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
ELECTRICAL DESIGN OF LOSSY HIGH-INCIDENCE RADOMES, by S. Wolin. Rept. on TED Proj. no. ADC EL-800. 11 July 50, 139p. 5 refs. Rept. no. NADC EL-123-50.
Order from LC mi$6.90, ph$21.30 PB 142 015

This report considers radome design requirements and construction and the manner in which absorption losses affect radome performance. Equations for lossy radomes are given, and a number of transmission curves are computed for lossy sandwich panels. The report also contains the design procedure for lossy high-incidence radomes, methods for obtaining optimum core thickness for maximum transmission, and a discussion of the effects of dimensional tolerances on transmission.

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
INVESTIGATION OF ANALYTICAL DESIGN TECHNIQUES FOR ELECTRONIC EQUIPMENT INSULATING BARRIERS, by A. R. Saltzman. Interim rept. on TED Proj. ADC EL-9021. 25 Oct 57, 62p. 5 refs. Rept. no. NADC-EL-5764.
Order from LC mi$3.90, ph$10.80 PB 142 017

Air Force Cambridge Research Center, Bedford, Mass.
A LARGE SCREEN DIGITAL DATA DISPLAY FOR THE AN/TSQ-13, by Harold C. Porter. Mar 59, 11p. AFCRC-TR-59-113; AD-211 214.
Order from LC mi$2.40, ph$3.30 PB 142 197

The purpose of this task was to evaluate the design feasibility and the operational merits of a new, large-screen digital data display using 121 sq. in. of display area as opposed to the 49 sq. in. currently in use in the AN/TSQ-13, data-processing portion of the TACS-BADGE system. In both cases the maximum number of targets was 100. This re-

port covers the approach used and the mechanical results obtained. It was originally intended to conduct a series of tests of the human engineering involved from the operating standpoint. However, revised requirements of TACS and BADGE systems made such equipment unnecessary and the operational evaluation was cancelled.

Air Force Cambridge Research Center, Bedford, Mass.
PITCH EXTRACTION FOR SPEECH SYNTHESIS WITH SPECIAL TECHNIQUES FOR USE IN DIGITIZED BANDWIDTH COMPRESSION SYSTEMS, by Lawrence V. Kriger. Mar 59, 52p. 56 refs. AFCRC-TR-59-116; AD-214 449.
Order from LC mi$3.60, ph$9.30 PB 142 207

Pitch channel techniques for voice compression systems are reviewed. Time and frequency domain methods for pitch extraction are compared. The problem of extracting pitch from band-limited circuits which have no fundamental present is treated. Techniques are shown for improving the rise and fall resolution of the inverted pitch analog signal. Digital transmission of pitch channel information at rates below 150 bits per second is discussed. A hiss-buzz segmenter is described for use in pitch channel squelch, selecting hiss or buzz excitation, reducing rise time of derived pitch analog signal, and a special bit-rate reduction technique in digital signal transmission. Tracking requirements for a universal pitch extractor are discussed. Pitch roughness, pitch AGC, and a linear buzz oscillator are also treated. The pitch channel used in the AFCRC Scanvocoder is described in detail.

Air Force Cambridge Research Center, Bedford, Mass.
A TRANSISTORIZED RADAR TARGET TRACKER, by Thomas C. Horth. Mar 59, 42p. 7 refs. AFCRC-TR-59-115; AD-214 448.
Order from LC mi$3.30, ph$7.80 PB 142 196

Airborne vehicles must be tracked in ground environment systems for area defense, air traffic control, and terminal area control. When many aircraft are involved, tracking radars are not practical, and the necessary data must be obtained by automatic trackers from a scanning radar. All critical parts of a transistorized cartesian coordinate tracker have been designed and tested. The results indicate that it should perform as well as the latest vacuum-tube trackers, but with much greater reliability.

Airborne Instruments Lab., Inc., Mineola, N. Y.
INVESTIGATION OF MTI SYSTEMS, by W. J. Dauksher, C. A. Fowler and others. Final engineering rept. on Contract AF 28(099)260. July 52, declassified 13 Jan 55, 300p. 6 refs. Rept. no. 447-1; ATI-160 147.
Order from LC mi$11.10, ph$45.60 PB 142 130

A study was made of means for improving the overall performance of MTI systems. The following specific subjects were included in this study: (1) improvement of AN/GPA-7A MTI kit, (2) elimination of blind phases, (3) investigation of different types of stalos, (4) limitations due to i-f transients, (5) factors affecting coho locking, (6) velocity response shaping, (7) effect of antenna scanning on performance, (8) passband ripples, and (9) MTI test equipment and measurement procedures.

Armour Research Foundation, Chicago, Ill.
STUDY OF CRYSTAL OSCILLATOR CIRCUITS, by H. E. Gruen and A. O. Plait. Quarterly progress rept. no. 6, 15 Aug-15 Nov 56, on Contract DA 36-039-sc-64609. [1956] 51p.
Order from LC mi$3.60, ph$9.30 PB 142 169

A complete design method is presented for the Grounded Grid crystal oscillator, operating in the frequency range of 75 to 150 mc. Design information is presented in the form of graphs and tables. A reference circuit, having a single set of values for the frequence range covered has been devised, and by varying the circuit component values measurements of performance have been made and plotted. The resulting graphs are normalized with respect to the reference circuit component and performance figures. In this way, output and crystal drive voltage variations were determined for specific changes in circuit parameters. The accuracy of performance prediction is 20 to 25 percent for output voltage and 35 to 40 percent for crystal drive voltage. A review and discussion of four crystal oscillators using subminiature filament-type tubes is presented. These are the Grounded Grid, Feedback, or Heegner, the Capacitance Transformer Coupled and the Bridged "T" circuits. Work on the Capacitance Transformer Coupled oscillator at 75 mc has been completed and performance characteristics are given. Since this oscillator has more desirable performance figures than the other oscillators tested, future work will be confined to obtaining information for this circuit at higher frequencies. (See also PB 142 168)

Armour Research Foundation, Chicago, Ill.
A STUDY OF CRYSTAL OSCILLATOR CIRCUITS, by H. E. Gruen and A. O. Plait. Quarterly progress rept. no. 8, 15 Feb-15 May 57, on Contract DA 36-039-sc-64609. [1957] 35p. 2 refs. AD-140 279.
Order from LC mi$3.00, ph$6.30 PB 142 400

Performance information for the Cathode Coupled and Grounded Grid oscillators for the 10 to 75 mc frequency range is reported. Reference circuits and their performance as a function of frequency have been established. Effects of component variation have been determined, and shown to be adequately described by the normalized curves developed for higher frequency operation. Initial problems of frequency and crystal voltage correlation have been resolved. These are shown to be caused by the effect of the plate-to-cathode capacitance. Correction is obtained by the addition of an inductor in series with the crystal in the feedback path. The design information for the Grounded Grid circuit in this frequency range has been found to be essentially an extension of the results obtained in the higher frequency range. A discussion of the problems encountered with the Cathode Coupled circuit is given. However, its performance at the lower frequencies is compared with that at the higher frequency range and differences are noted. Temperature characteristics and oscillator output harmonic content measurements for the two series resonant circuits

in the 75 to 150 mc frequency range are reported. Extension of the antiresonant circuit design information to 20 mc has been completed for the Colpitts circuit, and work on the Electron Coupled Colpitts is in progress. The previously developed design information is shown to be useful to 20 mc without any loss of accuracy over that originally specified.

Armour Research Foundation, Chicago, Ill.
VERY HIGH FREQUENCY CRYSTAL OSCILLATOR CIRCUITS, by A. O. Plait and H. E. Gruen. Quarterly progress rept. no. 2 on Contract DA 36-039-sc-64609. 15 Nov 55, 28p. 9 refs.
Order from LC mi$2.70, ph$4.80 PB 142 166

Preliminary experimental and analytical results of crystal oscillators operating at 75 and 105 megacycles are reported, as part of an investigation of oscillator operation in the entire range from 75 to 150 megacycles. Evaluation and comparison of various circuits are made with respect to specific parameters, which include power output, crystal driving power, power ratios, operating frequency and stability. The circuits tested are the Cathode-Coupled, Transformer-Coupled, Grounded Grid, Bridged "T" and Colpitts oscillators. Resulting data and analysis indicate that the most promising circuits for use at the higher frequencies are the Cathode-Coupled and the Grounded Grid. Careful attention is paid to experimental data in view of applying this information to development of design criteria for oscillators operating in the desired frequency range. A discussion of crystal drive-voltage harmonic content is included, and an analysis is made of measuring techniques as applied to the effects of harmonics on crystal driving power. In addition, methods of crystal parameter measurement are discussed.

Armour Research Foundation, Chicago, Ill.
VERY HIGH FREQUENCY CRYSTAL OSCILLATOR CIRCUITS, by H. E. Gruen and A. O. Plait. Quarterly progress rept. no. 3, 15 Nov 55-15 Feb 56, on Contract DA 36-039-sc-64609. [1956] 48p.
Order from LC mi$3.30, ph$7.80 PB 142 167

Experimental and analytical results of Grounded Grid and Cathode Coupled crystal oscillators operating at 120, 135, and 150 megacycles are reported, completing a preliminary investigation of oscillator operation in the frequency range of 75 to 150 megacycles. Evaluation and comparison of the circuits are made with respect to specific parameters, which include power output, crystal driving power, power ratios, operating frequency and stability. Careful attention is paid to experimental data in view of applying this information to the development of a design method for oscillators operating in the desired frequency range. A discussion and analysis is made of the effects on circuit performance of plate tank detuning and variations in the Q of the tank inductance. Methods of crystal parameter measurements are included. The effect on operating frequency of using a shunt compensating inductance across the crystal unit is discussed, and equations for loop gain and stability are presented. (See also PB 142 166)

Armour Research Foundation, Chicago, Ill.
STUDY OF CRYSTAL OSCILLATOR CIRCUITS, by H. E. Gruen and A. O. Plait. Quarterly progress rept. no. 5, 15 May-15 Aug 56, on Contract DA 36-039-sc-64609. [1956] 32p.
Order from LC mi$3.00, ph$6.30 PB 142 168

Preliminary design data presentation methods are shown for the Grounded Grid and Cathode Coupled crystal oscillators operating in the 75 to 150 mc frequency range. Design data previously reported is presented for a generalized Grounded Grid circuit. Work is continuing on this presentation method for both circuits. Additional information on circuit performance is also being taken to check repeatability of results. Details of a differential meter design for accurate measurement of crystal voltage for use in drive level determination are given. The system utilizes a matched pair of germanium diodes in a probe which is connected to a modified vacuum tube voltmeter to provide difference voltage indications. Experimental results of an investigation of circuits suitable for use at 75 to 150 mc with filament type tubes are reported. A two-tube feedback or Heegner circuit has been investigated and has proven unsatisfactory for use with the low transconductance tubes available. Further investigations include a study of a capacitance transformer-coupled oscillator, in addition to other more common circuit arrangements. (See also PB 142 167)

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
EMPIRE DEVICES NOISE AND FIELD INTENSITY METER MODEL NF-105 MANUALS: SUPPLEMENT, by James Hamilton, Charles R. Wise, and Harvey G. Lassiter. 16 Mar 59, 42p. AFC Rept. # FIM 16-3-59.
Order from LC mi$3.30, ph$7.80 PB 142 233

This supplement is presented to assist operators and to clarify and expand upon the optimum use of the instrument. This document outlines the various types of measurements applicable to given circumstances, shows the step-by-step procedures and the tables and charts to be used, the units of measurement obtained, and illustrates examples of data conversion.

Army Signal [Research and Development] Lab., Fort Monmouth, N. J.
MEASUREMENTS OF VHF CRYSTAL PARAMETERS: A GRAPHICAL METHOD OF DATA REDUCTION, by E. Hafner. 25 Sep 57, 26p. 3 refs. Engineering rept. no. E-1216; AD-149 954.
Order from LC mi$2.70, ph$4.80 PB 142 122

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A SIMPLE TECHNIQUE FOR THE GENERATION OF TWO ELECTRIC PULSES AT INTERVALS OF ONE-TENTH MICROSECOND TO ONE MILLISECOND, by Thomas R. Jeter and Ona R. Layman. Apr 59, 12p. 2 refs. Technical note no. 1257.
Order from LC mi$2.40, ph$3.30 PB 142 273

A simple electro-optical method for obtaining a double pulse with the desired waveform for triggering two hydrogen thyratrons is described. The time delay between pulses is variable in the range .1 microsecond to 1.0 millisecond. The time base is obtained from the sweep trace on the face of a cathode ray tube of an oscilloscope.

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
RESEARCH INVESTIGATION OF CATHODE EMISSIVE MATERIALS. Scientific rept. no. 4 on Contract AF 19(604)3904. 15 Apr 59, 33p. AFCRC TN-59-368.
Order from LC mi$3.00, ph$6.30 PB 142 293

The work reported herein falls into two major categories, (a) developmental experiments on thorium-impregnated matrix cathodes, (b) underlying research concerning the possibility of desorption of the thorium film from the tungsten surface by electron bombardment.

Briggs Associates, Inc., Norristown, Pa.
STUDY OF CATHODE INTERFACE IMPEDANCE. VOL. I, by Thomas H. Briggs. Final rept. for 1 May 56-31 Oct 58 on Contract DA 36-039-sc-72336. [1958] 443p.
Order from LC mi$11.10, ph$71.10 PB 142 132

Cathode Interface has been studied through testing of 2000 twin diode and triode tests during 5000 life hours. Parameters were 4 commercial nickel cathode alloys, three standard tube manufacturers, 3 heater voltages and 3 cathode currents during life. Interface data are presented by a new procedure through analysis of variance. Many special tests are reported concerning effects of Al in Ni, gas in tubes, and geometry.

Briggs Associates, Inc., Norristown, Pa.
STUDY OF CATHODE INTERFACE IMPEDANCE. VOL. II. by Thomas H. Briggs. Final rept. for 1 May 56-31 Oct 58 on Contract DA 36-039-sc-72336. [1958] 238p. 73 refs.
Order from LC mi$10.20, ph$36.30 PB 142 131

Groups of Miniature Tubes produced under well controlled conditions were studied under a variety of life operating conditions, and were evaluated by a multiplicity of methods to provide new information concerning parameters influencing cathode interface impedance. (See also PB 142 132)

California U. [Berkeley].
ANALYTICAL REPRESENTATIONS OF THICK MAGNETRON BEAMS, by J. Wilhelm Klüver. Rept. on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, Contract AF 33(616)3278. Apr 59, 24p. 11 refs. WADC Technical rept. 58-671; AD-208 152.
Order from OTS $0.75 PB 151 887

A theoretical investigation is made in order to find approximate representations for the small-signal analysis of magnetron beams. The present investigation is of particular interest for the understanding of the initiation of the degenerating effects occuring in magnetron beams as well as of the small-signal aspects of the beam-circuit coupling problem. Three new analytical thick beam models are suggested and investigated. The first is a self-consistent model in which the effect of a d-c velocity distribution is included. The second approximate beam model includes only the two slipping r-f surface charge layers on each side of the beam. In the final model the effects of the r-f space charge density inside the beam are introduced in an approximate way.

California U. [Berkeley].
ELECTRON PHYSICS OF TRAVELING WAVE TUBE DEVICES, by J. R. Whinnery, D. H. Sloan and others. Rept. for 15 Aug 57 - 14 Dec 58 on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, Contract AF 33(616)3278. Feb 59, 24p. 13 refs. WADC Technical rept. 59-41; AD-209 128.
Order from OTS $0.75 PB 151 888

The work described includes theoretical and experimental studies on backward-wave interaction, light weight focusing systems and space-charge waves in periodic beams, crossed-field interaction, and d-c and r-f tests on novel high-density emitters. Supporting work on electron beams and large-signal studies is also described, as well as a preliminary study of variable parameter amplifiers.

California U. [Berkeley].
AN EXPERIMENTAL MICROWAVE REENTRANT BEAM TUBE, by Glenn Gray. Rept. on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, Contract AF 33(616)3278. Apr 59, 95p. 23 refs. WADC Technical rept. 58-607; AD-208 149.
Order from OTS $2.25 PB 151 886

This study represents essentially the experimental phase of a program begun for the purpose of determining the small-signal characteristics of reentrant beam devices. An experimental r-f tube has been constructed, utilizing an interdigital slow wave structure and crossed-field focusing. The results of a series of small-signal experiments are presented and are compared with the theory. The generally good qualitative agreement which is obtained confirms the appropriateness of using a single-velocity approach. The large-signal behavior of the experimental tube is briefly explored. From saturation measurements it is found that considerably higher saturation efficiencies are obtained for fully reentrant operation than for the corresponding non-reentrant case. Also, it is observed that the importance of the phase of reentrancy rapidly decreases at higher r-f drive levels. It is felt that both of these phenomena can be at least partly understood on the basis of some simple physical pictures that are proposed.

California U., Los Angeles.
ON THE OPTIMUM SYNTHESIS OF MULTIPOLE CONTROL SYSTEMS IN THE WIENER SENSE, by H. C. Hsieh and C. T. Leondes. Rept. on Contract AF 49(638)438. Mar 59, 63p. 1 ref., AFOSR TN-59-

263; AD-212 466.
Order from LC mi$3.90, ph$10.80 PB 142 298

This report is concerned with obtaining the optimum system in the Wiener sense for a multipole system. Earlier literature has shown how to obtain the mean-square value of the error when the multipole system transfer function has been specified, but thus far no published work has shown how to solve the synthesis problem, in general, for this case. The principal reason that this problem has appeared to be impossible of analytic solution thus far for cross correlation between the inputs is based on the fact that the usual variational approach results in a set of untractable simultaneous integral equations involving many complicated cross products of the desired weighting functions and the variational functions.

Case Inst. of Tech., Cleveland, Ohio.
HIGHER ORDER MODE PROPERTIES OF AN ARRAY OF PARALLEL METALLIC PLATES, by R. E. Collin. Scientific rept. no. 3 on Contract AF [19](604)3887. 23 Apr 59, 33p. 5 refs. AFCRC TN-59-192; AD-215 823.
Order from LC mi$3.00, ph$6.30 PB 142 026

A knowledge of the higher order mode reflection and transmission coefficients at the interface between free space and an infinite array of equi-spaced parallel plates is required in order to study the properties of a strip artificial dielectric medium. The classical analysis of Carlson and Heins is extended in order to obtain the required reflection and transmission coefficients. The problem is solved by means of a bilateral Laplace integral and a direct construction of the required transform. Only the case with the field polarized with the total magnetic vector parallel to the plates is considered.

Chicago Midway Labs., U. of Chicago, Ill.
THE CHANNELED, SHAPED-SCREEN IMAGE INTENSIFIER, by J. Burns and M. J. Neumann. Rept. on Contract AF 18(603)09. 31 July 58, 19p. 6 refs. CML-TN-P108-16; AFOSR TN-58[756]; AD[210 615].
Order from LC mi$2.40, ph$3.30 PB 137 372

Instead of relying on focusing fields to maintain resolution, one designs a multiplier which consists of tiny channels in parallel but isolated from each other so that electrons are always constrained to stay in one channel in going through the multiplier, then the resolution of the device would be fixed by the separation between channels and would be independent of the number of multiplying stages (dynodes) and independent of the initial energy spread of the secondary electrons. Moreover, one could dispense with the heavy and bulky focusing coils of the earlier designs since focusing in the usual sense is not employed in a channeled multiplier. Instead, the dynodes are spaced close together and held at different potentials in such a way that the electric fields draw the secondaries from one dynode on to the next, as is done in conventional photomultipliers of which the so-called Venetian-blind type is probably the closest analogy to the type of dynode structure that we are dealing with. This is the approach we have taken in the work to be described, and it has proved capable of giving resolutions determined solely by the size of the individual channels and of giving useful gain with relatively small voltages (100 to 400 volts) between dynodes which would be expected to reduce field emission difficulties often experienced with intensifier designs using high voltages.

Collins Radio Co., Cedar Rapids, Iowa.
SINGLE-SIDEBAND COMMUNICATIONS SYSTEM. Quarterly rept. no. 7, 15 Apr-15 July 57, on Contract AF 30(635)4504. 15 July 57, 97p. 6 refs. IDR-395-23; RADC-TN-57-397; AD-131 396.
Order from LC mi$5.40, ph$15.30 PB 142 394

Columbia U. School of Engineering, New York
NONPARAMETRIC METHODS FOR THE DETECTION OF SIGNALS IN NOISE, by Jack Capon. Doctoral thesis. Technical rept. no. T-1/N on Contract AF 19(604)4140. 12 Mar 59, 234p. 62 refs. Cu-2-59-AF 4140-EE; AFCRC TN-59-174; AD-214 389.
Order from LC mi$10.20, ph$36.30 PB 142 327

A detection criterion is formulated which leads to the design of detectors on the basis of much less a priori information. These non-parametric detectors are proposed as possible alternatives to the detectors studied in those situations where little a priori information is available. A concept known as asymptotic relative efficiency is employed to compare nonparametric detectors with some of the detectors investigated in the past. Using this criterion the efficiency of nonparametric detectors is found to be quite high. The application of the nonparametric detection criterion to the detection of nonstationary signals in noise is discussed. Nonparametric detectors are shown to possess certain advantages in detecting such signals.

Columbia U. School of Engineering, New York.
PUSLE WIDTH MODULATED RELAY CONTROL OF SYSTEMS SUBJECT TO SAMPLED DATA, by Winston L. Nelson. Technical rept. T-34/B on Contract AF18(600)677. [1957] 72p. 17 refs. AFOSR TN-59-282; AD-212 915.
Order from LC mi$4.50, ph$12.30 PB 142 367

This report investigates the application of pulse width modulation as a control method for relay controlled systems with sampling. The limit cycles which occur in relay control systems with sampling are discussed and two methods of design employing pulse width control which eliminate these limit cycles are developed. Experimental results are presented for a second order system. Application and extension of the results are discussed.

Continental Electronics Mfg. Co., Dallas, Tex.
DEVELOPMENT OF A 10 KILOWATT VHF AIRBORNE RADIO COMMUNICATIONS TRANSMITTER, by Henry A. Tackett. Final rept. on Contract AF 19(604)3060. Mar 59, 28p. AFCRC-TR-59-149; AD-216 101.
Order from LC mi$2.70, ph$4.80 PB 142 349

A general discussion is presented of the development of a 10 kw VHF airborne radio communications transmitter occupying only 4 cubic feet of space. The transmitter may employ either frequency shift keying

or frequency modulation. The transmitter may be remotely controlled. The system employs an external liquid cooling system.

Cruft Lab., Harvard U., Cambridge, Mass.
A DIPOLE ANTENNA COUPLED ELECTROMAGNETICALLY TO A TWO-WIRE TRANSMISSION LINE, by S. R. Seshadri and Keigo Iizuka. Scientific rept. no. 21 on Contract AF 19(604)786. 31 Oct 58, 47p. 3 refs. AFCRC TN-58-594; AD-208 045.
Order from LC mi$3.30, ph$7.80 PB 142 139

The properties of a dipole antenna coupled electromagnetically to a two-wire transmission line are studied experimentally. It is found that the coupling of the antenna to the transmission line can be maximized by a proper choice of (1) the angular position of the antenna with respect to the transmission line, (2) the legnth of the antenna, and (3) the separation of the antenna from the transmission line. The effect of the spacing between the wires of the transmission line on the optimum parameters is investigated. Measurements of (1) the current in the antenna as a function of its angular position and (2) the unbalanced component of current on the transmission line are also reported. It is found that the optimum angular position of the antenna is not noticeably altered if instead of a single antenna, an array of properly located antennas is used as the load. The advantage of an antenna array built on this coupling principle is discussed.

Eagle-Picher Research Labs., Joplin, Mo.
RESEARCH AND DEVELOPMENT STUDIES OF LOW TEMPERATURE CHARGING OF LEAD-ACID BATTERIES, by E. G. Hollman and E. J. Ritchie. Final rept. for 1 Jun-31 Aug 57 on Contracts DA 23-072-ORD-1134 and DA 23-072-ORD-598. 15 Oct 57, 95p. AD-147 361.
Order from LC mi$5.40, ph$15.30 PB 137 400

The problem of low temperature charging was studied with respect to the evolution of gas and the efficiency of charge at both room and low temperatures. The use of charging currents which varied in voltage to produce periodic pulses or swings was studied under a variety of conditions. Some slight advantage was found on charging with the use of swinging voltages at -40°F. in the charging circuit used. The use of inorganic sulfates, particularly lithium, added to the electrolyte of cells whose negatives did not contain organic expanders, was definitely advantageous for -40°F. cycling although detrimental at room temperature.

Eagle-Picher Co., Joplin, Mo.
SERVICES, FACILITIES AND MATERIALS LEADING TOWARD DEVELOPMENT OF RESERVE AND NON-RESERVE HIGH RATE BATTERIES FOR BOTH "A" AND "B" POWER, by E. M. Morse. Quarterly rept. no. 1 on Contract DA 36-039-sc-75067. 30 Aug 58, 27p.
Order from LC mi$2.70, ph$4.80 PB 137 493

The work carried out during this period has been concerned chiefly with the design of a chemically heated, automatically activated silver zinc battery. A number of units were tested and a rise time of less than two seconds was achieved on some units from -40° F. Programs have also been initiated and some preliminary work carried out with regard to weight reduction of the system. Planning is underway for programs to investigate the activated stand life of automatically activated batteries, a separable activation system and activation indicators.

Eastman Kodak Co., Rochester, N. Y.
DEVELOPMENT OF AMMONIA VAPOR ACTIVATED BATTERIES, by V. M. Bryant, Jr., J. R. Flynn, M. C. Sabath and others. Progress rept. no. 6, 1 Jan-30 June 58, on Contract DA 36-039-sc-71232. 1958, 87p. 10 refs.
Order from LC mi$4.80, ph$13.80 PB 137 495

The purpose of Contract SC-71232 is to develop two batteries using ammonia vapor activated electrochemical systems as a means of evaluating the practicability of the AVA system for various requirements. The two are being developed and designed concurrently to meet the requirements and operating conditions as specified.

Electrical Engineering Research Lab., U. of Texas, Austin.
DESIGN OF OPEN-ENDED MICROWAVE RESONANT CAVITIES, by Donald C. Thorn. Rept. on Contract Nonr-375(01). 25 Aug 58, 23p. 8 refs. Rept. no. 102.
Order from LC mi$2.70, ph$4.80 PB 142 035

This report describes the design and testing of two types of resonant microwave cavities operating near 9435 megacycles per second in which the end plates are replaced by terminations which leave the cross-sections of these cavities essentially unobstructed.

Electrical Engineering Research Lab., U. of Illinois, Urbana.
THEORETICAL INVESTIGATION OF OSCILLATOR CIRCUITS, by Norman R. Scott. Final rept. on Contract W36-039-sc-38202. 15 July 50, 58p. 17 refs.
Order from LC mi$3.60, ph$9.30 PB 142 402

Contents:
Development of criteria for amplitude stability
The equivalent single-loop oscillator
Effects of nonlinearity upon frequency stabilization

Electronic Communications, Inc., Timonium, Md.
FERRITE PHASE SHIFTER FOR THE UHF REGION, by C. M. Johnson and G. V. Buehler. Scientific rept. no. 1, 1 July 57-1 May 58, on Contract AF(604)2407. 27 May 58, 25p. 3 refs. AFCRC-TN-58-182; AD-152 430.
Order from LC mi$.270, ph$.80 PB 137 478

An extremely compact, low loss, ferrite phase shifter has been developed for the 200 to 800 Mc region. It consists of a folded stripline structure approximately 6 1/2-in. long and less than 1-in. square in cross section. The device requires a longitudinal magnetic field of sufficient intensity to place the operating region above resonance. For field swings of about 900 oersteds (from 430 to 1250 oersteds at 400 Mc), 360°

change in phase shift can be obtained with about 1 db of loss. The phase shifter is reciprocal and shows identical low power and high power characteristics up to at least 10-kw peak. Some additional data are included on the operation of the phase shifter down to 10 Mc and up to 2000 Mc.

Electronics Research Lab., Stanford U., Calif.
THE SYNTHESIS AND DESIGN OF GROUNDED-GRID STAGGERED-TRIPLES AT UHF, by Donald O. Pederson. Technical rept. no. 12 on Contract N6onr-251(32). 30 Sep 52, 60p. 4 refs.
Order from LC mi$3.60, ph$9.30 PB 142 433

This report will present the synthesis considerations, design procedures, and constructional features of uhf amplifiers described in Technical Report No. 11, "A 400 Mc I-F Amplifier", June, 1952. The reader is referred to this report, which serves as an introduction to the present report and indicates the results that can be obtained.

Electronics Research Lab., U. of California, Berkeley.
INJECTION OF SPACE-CHARGE-BALANCED ELECTRON BEAMS FOR MICROWAVE TUBES, by Vladislav Bevc. Scientific rept. no. 2 on Contract AF 19(604)2270. 15 June 58, 59p. 10 refs. Series no. 60, issue no. 204; AFCRC-TN-58-366; AD-160 810.
Order from LC mi$3.60, ph$9.30 PB 137 474

Cylindrically symmetric electron beams focused by axially symmetric magnetic fields which partly thread the cathode are studied. Solutions of the paraxial equation for the electron beam focused by magnetic fields of various distributions are obtained by an analog computer. Those solutions that match the slope at the anode aperture of a divergent electron gun are selected. A discussion of these solutions and a design procedure for construction of an experimental device is given. A perturbation analysis is applied to a space-charge-balanced electron beam and the effects of the deviations of initial radius, slope, and proper magnitude of the magnetic field for balanced flow on the amplitude of the scallops is considered. A proposal introducing the concept of beam stiffness is made in this connection. The electron tube built to test the theory and the associated apparatus is described. Observations of the cross-section of the beam at different positions from the electron gun are presented and discussed. Some optimal values are pointed out for which the scallops on the beam are minimal.

Electronics Research Lab., U. of California, Berkeley.
QUARTERLY PROGRESS REPORT. Rept. for 1 Jan-31 Mar 58 on Contracts N7onr-29529, Nonr-222(53), and Nonr-222(54). 15 Apr 58, 17p. 6 refs. IER series no. 60, issue no. 20.
Order from LC mi$2.40, ph$3.30 PB 139 448

Contents:
Diffraction of plane waves by a circular aperture in a thin infinite plane conductor
Backscattering cross-section of oblate spheroids
Arrays of single mode slots in multimode waveguide
Stripline between curved boundaries
Frequency independent antennas
Network theory
Transistor circuit research
Information theory
Millimeter wave astronomy
A study of nonlinear control systems

Electronics Research Lab., U. of California, Berkeley.
QUARTERLY PROGRESS REPORT. Rept. for 1 Apr-30 June 58 on Contracts N7onr-295(29) and Nonr-222(53, 54). 15 July 58, 19p. 4 refs. Series no. 60; issue no. 21.
Order from LC mi$2.40, ph$3.30 PB 142 398

Contents:
Diffraction of plane waves by a circular aperture in a thin infinite plane conductor
Backscattering cross-section ot oblate spheroids
Arrays of single mode slots in multimode waveguide
Stripline between curved boundaries
Frequency independent antennas
Network theory
Electronic circuit research
Information theory
Millimeter wave astronomy
Study of nonlinear control systems

Electronics Research Lab., U. of California, Berkeley.
SOME RESULTS FROM THE STUDY OF THE LARGE-SIGNAL BEHAVIOR OF CASCADE-CIRCUIT TRAVELING-WAVE TUBES, by W. H. Watson. Rept. on Electronic Component Sciences Research, Contract AF 33(616)3278. Oct 58, 33p. 13 refs. WADC Technical Rept. 58-211.
Order from OTS $1.00 PB 151 607

A study is made of the saturation characteristics of cascade-circuit traveling-wave tubes. Measurements made on several tubes indicated that the saturation efficiency of these cascade-circuit tubes was much lower than that for comparable single-circuit tubes. In order to explain these unusual results a series of calculations is carried out using approximate expressions which are based on simple physical pictures of the interaction process. It is possible to explain the measured results by using these simple physical pictures. The low saturation efficiency of the cascade-circuit backward-wave amplifier is found to tie due to the nature of the boundary conditions which must exist on the demodulator section. The cascade-circuit forward-wave amplifier, if properly designed would appear to have a saturation efficiency approaching that of a single circuit tube.

Electronics Research Labs., Columbia U., New York.
STUDY OF SAMPLED-DATA SYSTEMS. VOLUME I. SUMMARY, by R. E. Kalman. Final rept. F/127 on Contract AF 30(635)2815. 30 Sep 57, 10p. CU-27-57-AF-2815-EE; RADC TR-57-192; AD-131 394.
Order from LC mi$1.80, ph$1.80 PB 142 406

This is Volume I of the Final Report consisting of three volumes. This volume contains outlines of the specialized topics covered in the various reports which have

been issued earlier as well as outlines of the contents of the other two volumes of the Final Report. A brief discussion shows how the various results obtained in this project relate the problems associated with a sampled-data interception system. A number of recommendations are given in regard to further research on problems initiated by this project. A breakdown of personnel active on the project at various dates is also included.

Electronics Research Labs., Columbia U., New York.
[STUDY OF SAMPLED-DATA SYSTEMS]. VOLUME II. ANALYSIS AND SYNTHESIS OF LINEAR SYSTEMS OPERATING ON RANDOMLY SAMPLED DATA, by R. E. Kalman. Final rept. F/127 on Contract AF 30(635)2815. 10 Aug 57, 135p. 19 refs. CU-25-57-AF-2815-EE; RADC TR-57-169; AD-131 325.
Order from LC mi$6.90, ph$21.30 PB 142 405

This work presents a detailed theory of linear sampled-data systems in which time signals are sampled by an independent random process. Three principal contributions to the theory of such systems are presented. First, a generalized method of description of sampled-data systems is developed which is applicable to both conventional and randomly sampled systems. Second, the properties of randomly sampled systems are explored in detail. Third, a method of synthesis is presented which leads to a system whose response to step input signals is minimal according to any desired quadratic error criterion. (See also PB 142 406)

Emerson and Cuming, Inc., Canton, Mass.
SCIENTIFIC REPORT NO. 3, 1 JANUARY-1 APRIL 1958. Rept. on Contract AF 19(604)2448. 26 May 58, 14p. 2 refs. AFCRC TN-58-168; AD-152 405.
Order from LC mi$2.40, ph$3.30 PB 137 480

A 4π steradian microwave reflector (Eaton lens) 12" in diameter has been made, using an assemblage of hemispherical shells of dielectric material. Reflectivity measurements at S- and X-bands have been made. The devices function as an omni directional reflector but return is less than 10% of theoretical. Modification will be made to improve performance. (See also PB 131 835)

General Electric Co., Syracuse, N. Y.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF INDEPENDENT CONTROL OF THE E AND H-PLANE PHASE CENTERS AND CONTROL OF H-PLANE PATTERN WIDTH, by H. Q. Totten. Scientific rept. no. 2 on Antenna Beam Scanning, Contract AF 19(604)1848. 15 Aug 58, 18p. 1 ref. AFCRC TN-58-352; AD-160 793.
Order from LC mi$2.40, ph$3.30 PB 137 405

It has been shown in earlier investigations that changing the amplitude and/or the phase distribution across an aperture will alter the far field patterns of the aperture. The problem here is that the aperture involved (mouth of a horn) has fixed dimensions and it is desired to have control over the width of the far field pattern in the H-plane. The only means of controlling the pattern width is by altering the aperture distribution in some manner. It was chosen here to alter this distribution by placing in the aperture obstacles which would tend to concentrate energy in certain regions of the aperture. An analysis is made of various amplitude distributions and the far field patterns calculated. Experimental data taken verify the analytical results.

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
HARMONIC GENERATION AND FREQUENCY MIXING IN FERROMAGNETIC INSULATORS, by R. L. Jepsen. Scientific rept. no. 15 on Contract AF 19(604)1084. 25 May 58, 86p. 16 refs. AFCRC-TN-58-150; AD-152 381.
Order from LC mi$4.80, ph$13.80 PB 137 479

The present report in part extends the earlier work of Pippin on second-harmonic generation and frequency mixing to include the effects of longitudinal components of r-f magnetic fields. In addition, demagnetizing factors and loss in the Landau-Lifshitz form are simultaneously considered in the second-order calculations. A special case of third-harmonic generation is also treated. One result of importance has to do with the effectiveness of longitudinal components (in conjunction with the usual transverse components) of r-f magnetic fields in producing magnetizations in second order and higher.

Hughes Aircraft Co., Culver City, Calif.
HIGH FREQUENCY CRYSTAL FILTERS, by Leo Storch. Quarterly progress rept. no. 1, 1 Oct-31 Dec 56, on Development of Narrow-band Bypass Filters with Center Frequencies in the Range of 10 - 60 Mc. Contract DA 36-039-sc-73070. 1957, 84p. 20 refs. Rept. no. 73070-1-Q.
Order from LC mi$4.80, ph$13.80 PB 142 388

A set of convenient insertion loss equations is derived, which is applicable to the design of multisection, reactive, symmetric filters. Specific network designs for quartz crystal bandpass filters with sharp cutoff characteristics, and more than 60 db attenuation in the stop bands, are presented for two categories of fractional bandwidths: (1) less than or equal to 0.4 percent; (2) equal to or larger than 1.5 percent. Several network structures for each of these two categories are worked out and the corresponding insertion loss characteristics are plotted. Element values are given for a filter with a 6 db bandwidth of 40 kc with respect to a center frequency of 11.5 Mc. A design for a filter with a bandwidth of 400 kc with respect to a center frequency of 24 Mc is included. This design makes full allowance for the effects of coil dissipation. In an appendix, a general approach is outlined to the formation of lattice-type filters with 4, 6, and 8 peaks of infinite attenuation (i.e., zeros of transmission) and with image impedances suitable for (1) quartz crystal-capacitor filters possessing the maximum possible bandwidth for a given crystal cut and (2) quartz crystal-capacitor-inductor filters with a constant-k image impedance. Recent design progress is announced, which took place subsequent to the close of the first quarter and promises to lead to a very satisfactory filter designs in the fractional-bandwidth region between 0.4 percent and 1.5 percent.

Hupp Electronics Co., Carlisle, Pa.
INDUSTRIAL PREPAREDNESS STUDY ON MINIATURE SIZE CRYSTAL UNIT. Quarterly rept. nos. 3-5, 28 Oct 56-28 July 57, on Contract DA 36-039-sc-70275. [1957] 3 nos.
Order from LC

Quarterly rept. no. 3, 28 Oct 56-28 Jan 57, 6p.
mi$1.80, ph$1.80, PB 137 419
Quarterly rept. no. 4, 28 Jan-28 Apr 57, 6p.
mi$1.80, ph$1.80, PB 137 418
Quarterly rept. no. 5, 28 Apr-28 July 57, 4p.
mi$1.80, ph$1.80, PB 137 417

Hupp Electronics Co., Carlisle, Pa.
INDUSTRIAL PREPAREDNESS STUDY ON MINIATURE SIZE CRYSTAL UNITS. Quarterly rept. no. 7, 28 Oct 57-28 Jan 58, on Contract DA 36-039-sc-70275. [1958] 4p.
Order from LC mi$1.80, ph$1.80 PB 137 416

Crystals manufactured according to the procedures outlined here were fabricated into preproduction samples. Crystal units passed all tests and formal approval was received. (See also PB 137 417)

Institute of Mathematical Sciences, New York U., N. Y.
TWO DIMENSIONAL GREEN'S FUNCTION FOR A RIGHT ANGLED WEDGE UNDER AN IMPEDANCE BOUNDARY CONDITION, by Samuel N. Karp. Rept. on Contract AF 19(604)1717. Mar 59, 22p. 12 refs. Research rept. no. EM-129; AFCRC-TN-59-166; AD-213 608.
Order from LC mi$2.70, ph$4.80 PB 142 204

The Green's function is determined for a right angled wedge, when a constant impedance boundary condition is imposed on one face, while, on the other face, either the function or its normal derivative is required to vanish. The solution is shown to be expressible by quadratures in terms of Green's functions for simpler problems. The latter are obtainable by separation of variables. The far field amplitude is shown a priori to be a simple algebraic combination of the known far field amplitudes of the simpler Green's functions. This algebraic combination contains a parameter which is fixed by the requirement that the far field amplitude be a regular function.

Lincoln Lab., Mass. Inst. of Tech., Cambridge.
MATCHING FILTERED AND UNFILTERED DISPLAYS, by Bert F. Green. Rept. on Contract AF 19(122)458. 27 July 53, declassified 13 Sep 57. 16p. 1 ref. Technical rept. no. 31.
Order from LC mi$2.40, ph$3.30 PB 142 223

It is often desirable to remove some information from a display so that only relevant data are presented. When a display of filtered information is used, there may arise the problem of matching the filtered display with the original unfiltered display. Two experiments have been conducted to determine the speed and accuracy with which a target on a typical filtered display can be matched with the corresponding target on the unfiltered display.

Material Lab., New York Naval Shipyard, Brooklyn.
EFFECT OF COMBINED FIRE AND WATER ON SILICONE INSULATED CABLES, by A. M. Deleeuw. Final rept. 20 Feb 59, 9p. Lab. Project 5248-121.
Order from OTS $0.50 PB 151 751

Representative specimens of electric cables utilizing silicone compounds as primary insulation were subjected to laboratory conditions simulating a fairly severe shipboard fire and subsequent extinction with salt water fog. A majority of the specimens sustained their rated operating voltage throughout the period of exposure to fire and subsequent salt water fog.

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION OF CABLE SPLICES FOR SHIPBOARD CATHODIC PROTECTION SYSTEMS, by Samuel H. Behr. Final rept. 26 Sep 58, 24p. Lab. project 5399-10.
Order from LC mi$2.70, ph$4.80 PB 142 030

Splicing of electric cables for shipboard cathodic protection systems. A determination of the reliability of weather exposed and submerged splices. Splicing methods include various taped splices, case epoxy resin splices and vulcanized splices. Quality of splice determined by electrical measurements and leakage caused by external water pressure before and after exposure.

Material Lab., New York Naval Shipyard, Brooklyn.
ROLLER CHART DATA FOR TV-3/U AND TV-10/U SERIES TUBE TESTERS. Final rept. 12 Mar 59, 2p. 1 ref. Lab. project 5315-78, Pt. 14.
Order from LC mi$1.80, ph$1.80 PB 142 031

Melpar, Inc., Falls Church, Va.
DYNAMIC ANTENNA PATTERN MEASURING FACILITY. Final rept. on Contract AF 08(616)57, 27 May 57, 27p. AFAC-TR-57-76; AD-135 968.
Order from LC mi$2.70, ph$4.80 PB 137 413

This report describes the design, construction and test of an in-flight pattern facility. It is intended as ground-based equipment capable of recording patterns of aircraft radar antennas while the aircraft is in flight. This facility has demonstrated that it is possible to record antenna patterns under these conditions. After a brief consideration of the relationship between this pattern facility and conventional pattern ranges, this report describes the development of the system. Each system component is considered in turn and their overall relationship is then described. The remainder of the report discusses test procedures utilized to determine the utility of the system, reliability considerations and, finally, the results which were obtained.

Michigan U. [Research Inst.] Ann Arbor.
THE DESIGN AND MEASURED CHARACTERISTICS OF 450Mc POWER DISTRIBUTED AMPLIFIER, by D. Hamburg. Technical memo. no. 48 on Contract DA 36-039-sc-63203. July 57, 31p. 3 refs. 2262-167-T.
Order from LC mi$3.00, ph$6.30 PB 139 442

This report presents the results of an investigation by the Electronic Defense Group into means of increasing the frequency capabilities of power distributed amplifiers. The design, physical construction, and electrical characteristics of a 6-tube 4X150A distributed amplifier and a 6-tube 4X250B distributed amplifier are described. These amplifiers demonstrate experimentally the validity of the theory of distributed amplifiers using dummy constant-k line sections between tubes. The amplifiers have upper cutoff frequencies in the neighborhood of 450 mc and useful output power capabilities. The output power capability is, however, a function of the duty cycle at which the amplifier is operated.

Microwave Associates, Inc., Burlington, Mass.
ENGINEERING REFINEMENT PROGRAM FOR S BAND TR TUBE EST-25( ), by Lawrence Gould. Quarterly progress rept. no. 1 for 21 Apr-31 June 58 on Contract DA 36-039-sc-75039. [1958] 32p.
Order from LC mi$3.00, ph$6.30 PB 139 372

A fabrication technique for encapsulated windows is described. It is shown that this technique is readily adaptable as a production method. The effect of noise generation from ignitor electrodes on deteriorating systems' noise figures is discussed. The ignitor electrode parameters to be investigated are ignitor material, gap spacing and cone geometry, ignitor dimensions, and gas fill. A model of the EST-25( ) four element TR tube was fabricated and tested for leakage energy as a function of gas fill. Conditions for gas fill could be obtained which yielded values of spike leakage energy of 0.1 ergs and ignitor interaction of 0.1 db.

Microwave Associates, Inc., Burlington, Mass.
INDUSTRIAL PREPAREDNESS STUDY ON SILICON MICROWAVE DIODES. Quarterly progress rept. no. 2, 28 Sep-27 Dec 57, on Contract DA 36-039-sc-75933. [1957] 34p.
Order from LC mi$3.00, ph$6.30 PB 142 128

The design and production engineering tasks required to achieve the 1N53B, and improved K_a-band microwave mixer diode, are outlined. Final results of the experimental work involving a substitution of graphite for silicon in the RF design study are reported. (See also PB 134 921)

Microwave Engineering Labs., Inc., Palo Alto, Calif.
RESEARCH AND DEVELOPMENT OF A SOLID STATE PARAMAGNETIC MASER, by Perry H. Vartanian. Quarterly progress rept. no. 3 (Scientific rept. no. 3) 10 Dec 58-9 Mar 59, on Contract AF 19(604)4071. 9 Apr 59, 23p. 1 ref. AFCRC-TN-59-181; AD-214 942.
Order from LC mi$2.70, ph$4.80 PB 142 347

Program is to increase the amplifying bandwidth of the paramagnetic maser through the use of slow-wave structures limited to the use of the single crystal, chromium doped sapphire, commonly called ruby, because of its chemical stability characteristics. (See also PB 140 405)

Microwave Lab., Stanford U., Calif.
BASIC MICROWAVE RESEARCH, by M. Chodorow. Scientific rept. no. 10, 1 Oct-31 Dec 58, on Contract AF 19(604)1930. Mar 59, 15p. 5 refs. M. L. rept. no. 560; AFCRC-TN-59-168; AD-213 851.
Order from LC mi$2.40, ph$3.30 PB 142 203

Coupled Cavity Theory. The analysis of an infinite cascade of lossless symmetric 2n-port networks has been continued. The details of this analysis and of its application are now being worked out. Plasma Physics Studies. In the work on parametric effects, definite experimental confirmation of parametric mixing in a plasma has been obtained. Non-Linear Propagation in Ferrite Media. The theory of frequency doubling in ferrite-loaded propagating structures is being studied.

Microwave Lab., Stanford U., Calif.
DEVELOPMENT OF HIGH-POWER, TRAVELING-WAVE AND HYBRID TUBES, by M. Chodorow. Scientific rept. no. 8, 15 July 56-31 July 58, on Contract AF 19(604)1924. Aug 58, 41p. M. L. rept. no. 536; AFCRC-TR-58-175; AD-160 815.
Order from LC mi$3.30, ph$7.80 PB 139 396

The work under this contract has resulted in a considerable advance in the high-power traveling-wave tube art. The last of the cloverleaf tubes built displayed quite satisfactory characteristics in gain, power output, and bandwidth; and it was quite free from the rather severe oscillation problems which had interfered with satisfactory operation of previous tubes which used the same general circuit. The performance characteristics of this satisfactory tube were reported in Scientific Report No. 7. Some of these are repeated in the present report for summary purposes. Preliminary results with the first hot-test tube built using the centipede circuit have also been encouraging. These are covered in the present report. (See also PB 136 050)

Microwave Physics Lab., Sylvania Electric Products, Inc., Mountain View, Calif.
INVESTIGATION OF THE USE OF ELECTRON CYCLOTRON RESONANCE TO OBTAIN MICROWAVE PHASE SHIFT, by Eldred F. Tubbs. Final rept. on Contract AF 19(604)2231. 9 Mar 59, 46p. 4 refs. AFCRC TR-59-134; AD-214 421.
Order from LC mi$3.30, ph$7.80 PB 142 185

The work of the second year of a program to investigate the feasibility of using electron cyclotron resonance to obtain an electronically controllable phase shift is reported. Measurements of the phase shift produced by a discharge in a coaxial line in a magnetic field are described and compared with the previously developed theory. The discharge was excited either by an r-f source of a few megacycles or by the microwave signal whose phase was being controlled. The r-f discharge appeared to produce a fairly uniform electron density which was desired for comparison with the theory. However, the discharge tended to be unstable and did not give sufficiently high phase shifts to be useful.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ASYMMETRICAL TROUGH WAVEGUIDE ANTENNAS, by W. Rotman and A. A. Oliner. Rept. on Contract AF 19(604)2031. 18 June 58, 39p. 9 refs. Research rept. R-671-58; PIB-599; AFCRC TN-58-186; AD-152 437.
Order from LC mi$3.00, ph$6.30 PB 137 483

Line source radiators of the leaky wave type may be constructed readily with trough waveguide, which consists of a rectangular trough containing a symmetrically located center fin. Two types of such radiators are investigated: a continuously asymmetrical form suitable for near end-fire radiation, and a periodically asymmetrical design permitting radiation through broadside. The propagation characteristics of the leaky wave on the continuously asymmetrical structure are determined theoretically by means of a transverse resonance procedure, and comparison is made with measured values. The influence of finite center fin thickness is also accounted for. Designs and radiation patterns are presented for a typical antenna of each type.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE MEASUREMENT PROBLEM IN ADAPTIVE SYSTEMS UTILIZING ANALOG COMPUTER TECHNIQUES, by Richard M. Corbin and Eliezer Mishkin. Rept. on Contract DA 30-069-ORD-1560. 23 Dec 58, 29p. 3 refs. Rept. R-699-58; PIB-627; AD-211 356.
Order from LC mi$2.70, ph$4.80 PB 142 252

This report concerns itself with the measurement of open loop parameters of a certain type of adaptive system. The adaptive system presented is a unit feedback control system in which the Analog Computer is utilized in measurement and control. It is assumed that the controlled process has a fixed structure with variable parameters, i.e. it can be represented by a constant number of poles and zeros, which although they occupy positions in the S-plane, may vary with time. The frequency independent gain of the forward transmission is also variable. Analog Computer operation in the real time domain facilitates the continuous or intermittent identification of the forward gain and the poles and zeros of the controlled process.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
PERIODIC STRUCTURES IN TROUGH WAVEGUIDE, by A. A. Oliner and W. Rotman. Rept. on Contract AF 19(604)2031. 9 July 58, 46p. 7 refs. Research rept. R-677-58; PIB-605; AFCRC TN-58-195; AD-152 452.
Order from LC mi$3.30, ph$7.80 PB 137 482

A center fin in trough waveguide can be modified in a periodic fashion to alter the propagation characteristics of the guide. Two such periodic modifications, one an array of circular holes and the second a periodic array of teeth, have been measured fairly extensively and analyzed theoretically. These configurations are useful in connection with antenna scanning or waveguide filter applications. The array of holes produces only a mild slowing of the propagating wave, but the toothed structure, which may alternatively be described as a series of flat strips extending beyond the edge of the fin, can cause the propagating wave to vary from a very slow to a very fast wave. The periodic structures are theoretically treated by two methods, a transverse resonance procedure and a periodic cell approach. These theoretical results agree very well with each other and with the measured data.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
STUDIES OF PULSE-TYPE MAGNETIC MODULATORS, A SUMMARY, by E. J. Smith. Final summary rept. on Contract AF 30(602)884. 9 July 57, 34p. 1 ref. Rept. R-588-57; PIB-516; RADC TR-57-143; AD-131 235.
Order from LC mi$3.00, ph$6.30 PB 137 378

A summary is given of previous investigations of the all-magnetic, ac, resonant-type magnetic modulator. These investigations include (1) the measurement of core loss and saturated permeability of thin magnetic tapes under pulse excitation, (2) the development of a design procedure for magnetic modulators with either a pulse forming network or pulse clipper and a linear resistive or biased-diode load, (3) the design and construction of a 2-megawatt modulator, and (4) the paper design of an 8-megawatt modulator.

Midland Mfg. Co., Inc., Kansas City, Kan.
INDUSTRIAL PREPAREDNESS STUDY ON QUARTZ CRYSTAL UNITS CR-56(XM-1)/U. Final rept. on Contract DA 36-039-sc-70276. 16 May 56, 30p.
Order from LC mi$2.70, ph$4.80 PB 137 415

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
COMMUTATED NETWORKS, by Laveen Kanal, Julius Tou, and Cornelius N. Weygandt. Rept. for 1 Sep 56-31 Aug 57 on Contract Nonr-551(25). 31 Aug 57, 86p. 12 refs. Moore School rept. no. 58-12; AD-153 540.
Order from LC mi$4.80, ph$13.80 PB 142 194

A basic form of commutated network is defined precisely, and 2 variations are specified. Type 1 networks are ungrounded between intervals in which they are connected to the rest of the circuit, and type 2 networks are grounded; type 1 appears to have the more interesting characteristics. Three classifications of analysis of commutated networks are discussed; these are piece-by-piece methods, sampled-data methods, and variable network methods. A steady state solution is defined for both networks which proves to be independent of initial energy distributions. Amplitude of frequency responses for certain simple cases of type 1 networks are obtained by piece-by-piece methods. Existing sampled-data techniques are shown to be inapplicable to type 1; these curves show comb-filter characteristics and are in substantial agreement with results of previous work (Transactions, IRE/ P.G.A.E., December 1953). Amplitude-frequency responses for certain simple cases of type 2 networks are obtained by sampled-data techniques. A new sampled-data technique, known as the τ-transform, is developed.

National Aeronautical Establishment (Canada).
THE BEHAVIOUR OF FINE COPPER-NICKEL ALLOY WIRES WITH NEGATIVE TEMPERATURE COEFFICIENTS OF RESISTANCE, by W. Wiebe. 23 Feb 59, 28p. 1 ref. Mechanical Engineering rept. MS-100.
Order from LC mi$2.70, ph$4.80 PB 142 419

A study was made of the behaviour of fine copper-nickel alloy wires with negative temperature coefficients of resistance during heat treatment. The results indicated that heat treatment had a pronounced effect upon the electrical resistance and the temperature coefficients of resistance of the wires and that continuous change of resistance occurred at temperatures above 500° F. The relationship of times of heat treatment of the wires in vacuum at 860°F and the resulting temperature coefficients of resistance have been recorded. Information so obtained proved useful in the choice of suitably heat-treated wires for the fabrication of experimental temperature self-compensating strain gauges for use on aluminum and steel alloys in the temperature range from 75° to 350°F. Appended to this report is a brief survey of information available with respect to experimental and commercial strain gauges, alloys and adhesives for use at elevated temperatures.

Naval Ordnance Test Station, China Lake, Calif.
THE VMS CONTROL UNIT, by Edward R. Resins. 1 Oct 57, 34p. 2 refs. NOTS-1856; NAVORD rept. 5633.
Order from LC mi$3.00, ph$6.30 PB 142 014

The Velocity Measurement System (VMS) Control Unit is an electronic device for coordinating the recording on magnetic tape of data obtained during track runs on SNORT. The unit edits the tape to a standardized format through the use of a 6-deck 50-position stepping switch and associated circuitry. Subsidiary to the editing function, the unit also reduces a 100-kc time base to a 50-kc time base, produces a zero-time pulse unique to VMS operations, and regulates the necessary power sources for its own operations. The unit may be used in either full automatic operation or with operator-control over any portion of the operating cycle.

Naval Research Lab., Washington, D. C.
THE EFFICIENCY OF A THERMOMAGNETIC GENERATOR, by H. E. Stauss. Final rept. 19 June 59 9p. 5 refs. NRL rept. 5328.
Order from OTS $0.50 PB 151 736

The maximum efficiency of a thermomagnetic generator that transforms heat energy directly into electrical energy by cycling a magnetic working substance through its Curie temperature was calculated. The results show that the electrical energy that can be obtained with this arrangement is of the magnitude of the maximum magnetic energy in the working substance. On the other hand the energy that must be supplied to the working substance is that corresponding to the usual specific heat plus that required to overcome the large Weiss field. Consequently the upper limit to the efficiency of a thermomagnetic generator is low, of the order of 10^{-3} percent or less. The efficiency of the production of usable electrical energy by an actual generator would be much less. A simple thermomagnetic generator was built and its performance was compared with the theoretical expectations.

Naval Research Lab., Washington, D. C.
STEADY-STATE RESPONSE OF A SYNCHRONIZED LC OSCILLATOR TO INCREMENTAL REACTANCE CHANGES, by G. Robinson. Interim rept. 30 June 59, 25p. 5 refs. NRL rept. 5308.
Order from LC mi$2.70, ph$4.80 PB 139 580

An LC oscillator may be synchronized by coupling the tank coil to a constant-frequency source. The coupling loop current exhibits useful large variations in magnitude for small increments ΔL or ΔC in the tank inductance or capacitance. A steady-state analysis shows the magnitude of the coupling loop current I_2 and the phase of I_2 relative to I_1, the tank current.

Naval Research Lab., Washington, D. C.
WAVEGUIDE DUMMY LOADS AND ATTENUATORS UTILIZING HIGH-GLOSS FERROMAGNETIC MATERIALS, by W. H. Emerson, R. W. Wright and others. Final rept. 18 June 59, 27p. 4 refs. NRL rept. 5304.
Order from OTS $0.75 PB 151 637

Prototype models of air-cooled dummy loads utilizing high-loss ferromagnetic materials as the dissipative element have been produced for several radar bands. It is characteristic of these thin ferromagnetic dissipative elements that their efficiency as dummy load material is almost constant as the frequency of operation is decreased. Copper fins 2 inches high and 1/32 inch thick were silver-soldered 3/4 inch apart on a 40-inch section of L-band rectangular waveguide. Thin layers of ferrite powder in silicone resin were properly applied to the inside walls to make a load capable of dissipating 10 kw of average power. The total weight of the load was 63 lb. Lithium ferrite was used to make a dissipative element for constructing an X-band dummy load capable of operating at temperatures well above those presently allowed. Thin strips of high-loss ferromagnetic material were placed on the narrow walls of X-band waveguide in order to make a variable attenuator with low insertion loss.

Naval Research Lab., Washington, D. C.
A WIDE-RANGE MULTIPLE-PULSE AMPLIFIER, by R. E. Koncen. Final rept. 29 June 59, 25p. 6 refs. NRL rept. 5292.
Order from LC mi$2.70, ph$4.80 PB 138 044

A new negative-pulse amplifier circuit capable of amplifying multiple-pulse code groups and suitable for use in crystal video receiver design is presented together with the results of an experimental study of the performance obtained in both single-stage and multiple-stage versions. Measurements on a four-stage amplifier employing two 12AT7 and two 5814 dual triodes revealed the following capabilities: (a) 90-db voltage amplification of negative one-microsecond pulses without amplifier instability or appreciable pulse distortion, (b) multiple-negative-pulse-group amplification

without appreciable recovery problems regardless of pulse separation in time, and (c) a usable dynamic range of 70 db or greater as a negative-pulse amplifier. When used in conjunction with a conventional S-band crystal video detector, a usable dynamic range of 40 db or greater was achieved with automatic limiting of all signals greater than -37 dbm, pulse reproduction and sensitivity depending mainly on characteristics of the crystal detector used.

New York U. Coll. of Engineering, N. Y.
DESIGN STUDY TOWARD DEVELOPMENT OF A TEST SET TO MEASURE TEMPERATURE CHARACTERISTICS OF CERAMIC CAPACITATORS, by Joseph Seton Smith. Final rept. for 15 Aug 50-14 Oct 51 on Contract DA 36-039-sc-214. [1951] 87p. 11 refs.
Order from LC mi$4.80, ph$13.80 PB 142 176

Techniques have been developed to measure temperature coefficients of capacitors to an increased degree of accuracy. Capacitance increments due to temperature variations can be measured to 0.0001 mmf or one percent, whichever is greater, with the exception of a very small range of capacitors. A test-panel sample holder was developed with a maximum contributing error of 0.00001 mmf per degree C change over a 225 degree C total temperature variation. A switching mechanism to allow measurement of one hundred samples in a day was devised, utilizing statistical techniques to reduce resettability errors as small as desired. A capacitance sensitive device in the form of a variable oscillator and standard increment capacitors were designed and developed for detecting and recording 0.0001 mmf capacitance changes. A discussion of the specifications of temperature coefficients of capacitors and recommendations for their amendment are included. Details concerning the construction of a temperature coefficient test set and measurement techniques are also given.

New York U. Coll. of Engineering, N. Y.
EXPERIMENTAL NULL-ZONE RECEPTION SYSTEMS, by David Hoffman. Scientific rept. no. 6 for 15 Jan 58-14 Jan 59 on Contract AF 19(604)1964. 14 Feb 59, 60p. 8 refs. AFCRC TN-59-152; AD-212 259.
Order from LC mi$3.60, ph$9.30 PB 142 384

This report presents a detailed description of the circuitry involved in the conversion of a simple null detection experimental model to a non-truncated feedback system. Moreover, it describes an amplitude distribution analyzer whose function is to determine accurately the statistics of the noise used in the experiment. Results for the simple null system and for a converted feedback system are shown to be in close agreement with theory for the signal-to-noise ratios and null widths considered. The study was made for thermally-generated noise interference. The simple null system was also examined for its performance in the presence of random pulse interference. The results conform with theory.

[Office of Scientific Research and Development. Div. 14]
TRAIN RATES IN A TWO-AXIS DIRECTOR, by H. M. James. 18 Sep 43. 14p. Rad Lab rept. 8.
Order from LC mi$2.40, ph$3.30 PB 142 121

The use on shipboard of a two-axis director for anti-aircraft fire involves serious difficulties because of the high train rates required for following an elevated target, especially from the smaller and less stable types of vessel. The difficulties become more serious the greater the elevation angle to the target, and result in the existence of an effective blind spot overhead, of an extent dependent on the amplitudes of roll and pitch, and the maximum possible train rate for the director. In this note we indicate the extent and character of the blind spot, and summarize certain conclusions which can be drawn concerning necessary or desirable rates of train, the utility of regenerative tracking, and the advantages of a three-axis director.

Ohio State U. Research Foundation, Columbus.
APPARATUS FOR MEASUREMENT OF THE MAGNETIC THRESHOLD CURVES FOR SUPERCONDUCTORS, by J. G. Daunt. Rept. on Contract AF 33(616)5083. Mar 59, 19p. 3 refs. WADC Technical rept. 57-652; AD-142 301.
Order from OTS $0.50 PB 151 877

An apparatus for measurement of the magnetic threshold curves for superconductors in the liquid helium temperature range is described in Section I. With this apparatus, the resistive transition from the superconducting to the normal state and vice versa can be measured as a function of temperature and magnetic field. Section II describes results of experimental investigations of the magnetic behavior of superconducting Ti-Sn alloys. The magnetic threshold curves were measured for three Ti-Sn alloys of Sn content 4, 8, and 10 atomic percent. The transition temperatures for the three alloys were 1.25°K, 1.90°K, and 1.86°k, respectively, and the slopes of the threshold curves were approximately 23 kilogauss per degree for all three. A discussion is given of the interpretation of the results.

Ohio State U. Research Foundation, Columbus.
RESEARCH ON PHYSICAL LIMITATIONS ON PRODUCTION AND USE OF RF ENERGY IN MILLIMETER WAVELENGTH RANGE, by M. O. Thurston and W. H. Cornetet, Jr. Final rept. on Contract AF 49(638)53. July 58, 61p. 54 refs. Rept. 719; AFOSR-TR-58-133; AD-203 711.
Order from LC mi$3.90, ph$10.80 PB 139 464

The results of a survey of the literature on millimeter wavelength devices is presented. The high frequency limit for most conventional sources is in the range from 3 mm to 1 mm. Harmonic generators of several types are discussed. A detailed analysis of a velocity variation harmonic generator is followed by a preliminary analysis of frequency multipliers based on field emission and on the failure of Ohm's law in semiconductors. The feasibility of obtaining sub-millimeter waves from the radiation of electrons in a high magnetic field is also investigated.

Pennsylvania State U., University Park.
CORONA TYPE LOUDSPEAKER, by Fujio Oda. Rept. on Generation, Propagation, Action and Control of Acoustic Energy, Contract AF 33(616)2505. July 58, 74p. 9 refs. WADC Technical rept. 58-368; AD-155 782.
Order from LC mi$4.50, ph$12.30 PB 142 024

This report describes the development of a high frequency (1-50 kc), high power (1.3 kw) speaker needed in a biological research. It includes a theoretical discussion of corona sound generation (thermal) and the reasons for upper (corona size) and lower (corona cooling rate) frequency limitations. Eleven speaker designs were tested. A 60 watt and a 1.3 kilowatt speaker system are described.

Peters, O. S., Co., Washington, D. C.
DEVELOPMENT OF FREQUENCY DIVIDER TS-711()/U, by Joseph Kriz and Gilbert B. Seymour. Final progress rept. for 20 Mar 51-4 Feb 54 on Contract DA 36-039-sc-5534. [1954] 114p.
Order from LC mi$6.00, ph$18.30 PB 142 210

This development is concerned with the provision of an instrument capable of accepting frequencies in the range of 20 to 500 megacycles and by a process of division using appropriate circuits, reducing such frequencies to a range of 1 to 10 megacycles. In the lower range of 1 to 10 megacycles, precise frequency measurements may be made through the medium of measuring equipment available in most laboratories. By the use of such a method, the higher frequencies may be measured with a high degree of accuracy. It has been determined that certain types of oscillator circuits can be made to synchronize their fundamental or harmonic frequencies with external frequencies that are integral or fractional multiples of the oscillator frequency. Five stages of such oscillators working at their second harmonic with their associated lock indicator stages have been combined to cover the frequency range up to 200 megacycles. An RF amplifier covering the range of 20 to 200 megacycles is required to increase the amplitude of the unknown signal to a point where it can be made to lock the first divider stage or any other stage that is to be used for the first division. Two meters are used in the operation of the equipment: one for lock indication or divider tuning; the other for the RF amplifier tuning. Appropriate switching is included to allow for flexibility in operation. The entire unit with its power supply is built on a chassis with panel size of 8-3/4" x 19" to fit the standard racks.

Pickard and Burns, Inc., Needham, Mass.
ADDENDUM REPORT ON NAVARHO EVALUATION (APPENDICES). Rept. for 1 June-30 Aug 57 on Contract AF 30(635)4487. 11 Apr 58, 107p. 1 ref. P&B Pub. no. 462; RADC TN-58-142B; AD-148 744.
Order from LC mi$5.70, ph$16.80 PB 142 129

Contents:
Investigation to determine the effect causing a 2 to 3 degrees offset in bearing data at the Boulder, Colorado Monitor Station
Detailed report on new transistorized NAVARHO receiver field test
Additional flight test data
(See also PB 135 703)

Rome Air Development Center, Griffiss AFB, N. Y.
APPLICATION OF THE THEORY OF GAMES TO RADAR RECEPTION PROBLEMS, by Nils J. Nilsson. May 59, 22p. 8 refs. RADC-TN-59-100; AD-212 427.
Order from LC mi$2.70, ph$4.80 PB 142 182

The problem of radar reception in the presence of jamming is treated by an application of the theory of games. The game formulation is as follows: assume the radar receiver employs a matched filter, matched to the radar echo signal, and let the choice of band-limited power spectral distributions for both the radar signal and the jamming noise constitute the respective strategy decisions for the radar designer and the jammer. Games with strategies of this type are known as function-space games.

Rome Air Development Center, Griffiss AFB, N. Y.
COMPARISON TESTING OF MODULATION MODES FOR HIGH-FREQUENCY GROUND-TO-AIR VOICE COMMUNICATIONS, by Donald E. LeBrun and Adolph J. Uryniak. May 59, 19p. RADC-TR-59-55; AD-213 785.
Order from LC mi$2.40, ph$3.30 PB 142 184

This report describes an extensive series of tests which were conducted to obtain a practical comparison between (1) single sideband suppressed carrier (SSBSC); (2) double sideband amplitude modulated (DSB-AM); (3) double sideband suppressed carrier (DSBSC); and (4) pilot carrier or synchronous single sideband (SSSB). These tests were conducted by RADC, USAF, over a period of one year. Data were gathered by means of sequentially transmitting phonetically-balanced (PB) word lists via the various modes, and analyzing the recorded results for intelligibility.

Rome Air Development Center, Griffiss AFB, N. Y.
PHILOSOPHY OF THE GENERAL PROBLEM OF SEARCH AND DETECTION, by Patricia M. Langendorf. May 59, 10p. RADC-TN-59-130; AD-213 583.
Order from LC mi$1.80, ph$1.80 PB 142 183

This report is a study of how a detection system should operate to maximize detection in the absence of information regarding the signal to be detected. The results of this study indicate that the best methods of search can be developed for any transmitter without time cycle, or one whose time cycle is known.

Rome Air Development Center, Griffiss AFB, N. Y.
RADAR TEST SET AN/UPM-68, by Anthony D. Fugari. Apr 59, 55p. 2 refs. RADC-TR-59-9; AD-209 075.
Order from LC mi$3.60, ph$9.30 PB 142 144

This report describes a test instrument developed for use in measuring subclutter visibility and cancellation ratio figures of Moving Target Indicator (MTI) radar sets. To give an insight into the test equipment stability requirements, there is a review of the engineering changes to the original requirements (made to stay abreast of the state-of-the-art), and a discussion of the design problems encountered.

Stanford Electronics Labs., Stanford U., Calif.
EXTERNAL-CIRCUIT TRAVELING-WAVE AMPLIFIERS, by G. A. Loew. Technical rept. no. 34 on Contract Nonr-225(24). 21 Apr 58, 172p. 22 refs.
Order from LC mi$8.10, ph$27.30 PB 139 460

The work presented in this report is concerned with the study of external-circuit traveling-wave amplifiers. It directly follows a series of earlier studies conducted in these laboratories on the theory of such tubes and their operation as backward-wave oscillators. The distinguishing feature of external-circuit traveling-wave tubes is that they consist of a combination of two separate parts: a vacuum interaction structure containing an array of equally spaced drift tubes through which the electron beam is sent, and a removable external slow-wave structure which is connected onto the interaction structure and which can be modified at will. Such an arrangement provides great flexibility in both experimentation and practical applications. The vacuum interaction structure utilized throughout this investigation is the one previously used by A. R. Matthews and it is not described here in detail.

Stanford Electronics Labs., Stanford U., Calif.
INTERSTAGES FOR TRANSISTOR VIDEO AMPLIFIERS, by J. J. Spilker. Technical rept. no. 33 on Contract Nonr-225(24). 21 Apr 58, 139p. 36 refs.
Order from LC mi$6.90, ph$21.30 PB 139 459

This study presents a method of designing interstages for transistor video amplifiers. The transistors are represented by the hybrid-pi equivalent circuit. The problem of designing interstages is shown equivalent to the problem of synthesizing a transfer impedance function proportional to the stage gain where the resulting interstage network must have certain specified terminating impedances. These terminating impedances represent the effects of the transistors. The interstage synthesis technique developed emphasizes the importance of the interstage using a limited number of elements and providing a satisfactory gain-bandwidth product.

Stanford Electronics Labs., Stanford U., Calif.
MODIFIED MULTIFILAR HELICES FOR USE IN WIDE-BAND TRAVELING-WAVE TUBES, by D. G. Bow. Technical rept. no. 37 on Contract Nonr-225(24). 23 May 58, 122p. 26 refs.
Order from LC mi$6.30, ph$19.80 PB 142 393

This study has demonstrated the practical utilization of a modified multifilar helix as the slow-wave circuit in a traveling-wave amplifier. The advantages of the multifilar helix are principally the increased beam interaction impedance which is available and the capability for wide-band forward-wave amplification at large values of ka, the normalized diameter-to-wavelength ratio. A method of strapping the bifilar helix with rods directly through the center has been developed. This form of strapping allows separate control over the properties of the electric and magnetic fields of the two modes. In addition to extensive theoretical calculations and cold-circuit measurements, two models of an experimental traveling-wave tube have been constructed and operated in good agreement with the theoretical expectations.

Stanford Electronics Labs., Stanford U., Calif.
THEORY OF C-W SOLID STATE MASERS, by P. N. Butcher. Rept. on Contract DA 36-039-sc-73178. 16 Dec 57, 143p. 28 refs. Technical rept. no. 155-1.
Order from LC mi$7.20, ph$22.80 PB 137 391

This report is concerned with several aspects of the theory of c-w solid-state masers which use crystals containing paramagnetic ions as the active material. The density matrix describing a particular ion is calculated in the presence of the pump and signal fields. It is used to determine the engineering characteristics of various maser amplifiers.

University of Southern California, Los Angeles.
ELECTRONICS PRE-ARRIVAL INSPECTIONS: A FIELD STUDY, by Glenn L. Bryan, Nicholas A. Bond, Jr. and Harold A. LaPorte, Jr. Technical rept. no. 23 on Contract Nonr-228(02). Apr 58, 91p. 47 refs.
Order from LC mi$5.40, ph$15.30 PB 139 382

The inspection of shipboard electronic equipment prior to overhaul is viewed as an important event in the ship's repair cycle. A descriptive and analytic treatment of the pre-arrival inspection is presented, with the aims of (a) delineating certain managerial and motivational problems connected with the inspections, and (b) pointing out some possible alternatives to present procedures. The main body of the report consists of 50 questions with brief answers. The answers are based on responses of individuals to interview questions, card-sorting tasks, and questionnaire items. The sample consists of 133 persons drawn from staffs, yards, and ships on the WestCoast. The concluding section of the report offers the candid opinions of the authors regarding the inspection and suggests certain positive changes that might be made within the present repair system.

Western Electric Co., Laureldale, Pa.
INDUSTRIAL PREPAREDNESS STUDY: SILICON DIODES, by R. F. Lipscomb, W. D. Boynton, and P. Zuk. Quarterly progress rept. no. 10, 1 Oct-31 Dec 57 on Contract DA 36-039-sc-70243. [1957] 76p. 5 refs.
Order from LC mi$4.50, ph$12.30 PB 139 435

The purpose of this contract is to establish production designs on a low, medium and high voltage reference diode and a low and medium current rectifier.

Willow Run Labs., U. of Michigan, Ann Arbor.
RUBY AS A MASER MATERIAL, by C. Kikuchi, J. Lambe and others. Technical memo. on Contract AF 49(638)68. May 59, 26p. 33 refs. 2616-6-R; AFOSR TN-58-938; AD-205 088.
Order from LC mi$2.70, ph$4.80 PB 142 022

Ruby has suitable spin-lattice relaxation times for

good maser operation, and, in addition, has excellent thermal, electrical, and mechanical properties for its use as maser material.

Ordnance, Missiles, and Satellite Vehicles

Air Force Missile Development Center, Holloman AFB, N. Mex.
BIBLIOGRAPHY FOR SATELLITE ORBIT COMPUTATIONS, by James A. Ward. June 59. 28p. 121 refs. AFMDC-TR-59-22; AD-215 468.
Order from LC mi$2.70, ph$4.80 PB 142 081

A bibliography of titles and brief abstracts of articles which are considered useful to individuals who are primarily interested in the theory and practice of computation of satellite orbits, particularly the orbits of artificial satellites of the earth.

Army Chemical Warfare Labs., Army Chemical Center, Md.
THE DEPENDENCE OF VULNERABILITY ON TARGET SHAPE AND SIZE, by Joseph B. Creegan, Jr. and H. Taylor Markward. Rept. for Nov 56-June 58 on Wound Ballistics. Mar 59, 22p. CWLR 2273.
Order from LC mi$2.70, ph$4.80 PB 142 249

The vulnerability of various targets, including targets consisting of human silhouettes, to multiple simultaneous missile hits is investigated. The pattern of dispersal of the missiles is taken to have the form of an integer plane lattice. The vulnerability of a given target is found to be dependent upon its size and shape. The results obtained from the investigation suggest that a more "compact" target has a greater probability of being hit than a long thin target of the same area. Another question that is investigated is just how close together the lattice points of a fragment pattern must be in order to assure certainty of hitting a given target.

Arnold Engineering Development Center [Tullahoma, Tenn.]
PRELIMINARY DEVELOPMENT OF TELEMETRY FOR AEROBALLISTIC RANGES, by M. K. Kingery. Rept. on ARO, Inc. Contract AF 40(600)700 S/A 13(59-1). Feb 59, 23p. 2 refs. AEDC TN-59-7; AD-208 692.
Order from LC mi$2.70, ph$4.80 PB 139 465

Early telemetry work, undertaken in connection with the development of the hypervelocity aeroballistic range at AEDC, is discussed. The development of a one-channel, telemeter oscillator is described. Launching and recovery technique and accompanying instrumentation apparatus are explained. Typical test data are presented, which indicate the ability of the telemeter oscillator to successfully withstand initial accelerations in excess of 200,000 g's and to continue to function at velocities between 1000 and 2600 fps.

Bureau of Mines, Pittsburgh, Pa.
MEASUREMENTS OF THE ELECTRICAL WAVEFORMS OF LOW-ENERGY SPARK DISCHARGES, by Kenneth Lipman and Paul G. Guest. Rept. on Contract Nonr-1858(25). Sep 58, 21p. Proj. Squid Technical rept. BUM-27-R.
Order from LC mi$2.70, ph$4.80 PB 142 352

Auxiliary equipment was assembled around a purchased oscillograph to permit observation of the current and voltage characteristics of low-energy, capacitance-discharge sparks having durations of at least 10 millimicroseconds. Circuit details of the assembled apparatus, performance characteristics of the complete system, and some preliminary data from representative self-initiated sparks are given in this report.

Explosives Research Group, U. of Utah, Salt Lake City.
X-RAY TECHNIQUE FOR MEASURING DENSITY VS DISTANCE RELATIONSHIPS IN DETONATING EXPLOSIVES, by T. K. Collins. Technical rept. no. 54 on Contract N7onr-451(07). 30 Sep 58, 24p. 1 ref.
Order from LC mi$2.70, ph$4.80 PB 140 988

Fairchild Engine Div., Deer Park, N. Y.
PROPERTIES OF OBLIQUE DETONATION WAVES, by W. Chinitz, L. C. Bohrer, and K. M. Foreman. Rept. on Contract AF 49(638)15. 15 Apr 59, 80p. 5 refs. AFOSR TN-59-462; AD-215 267.
Order from LC mi$4.50, ph$12.30 PB 142 018

The two-dimensional steady flow equations for oblique detonation waves are solved for the conditions across the wave in terms of the initial Mach number, the heat addition, and the wave angle. Using an I. B. M. digital computer, the resulting equations are solved over a range of the independent variables. Graphs are presented which show the results of this computation.

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
METHODS FOR INCREASING THE EFFICIENCY OF LETHALITY COMPUTATIONS, by Sylvain Ehrenfeld. May 59, 39p. 8 refs. Technical rept. 2512.
Order from LC mi$3.00, ph$6.30 PB 142 140

The Monte Carlo method is examined as it is used to calculate lethal area on high speed digital computers. The primary object of the examination is to determine what sampling procedures are most efficient in this context. Theoretical justifications are given for a number of sampling procedures, and a detailed set of data is examined by way of illustration.

Naval Ordnance Lab., Corona, Calif.
NOLC ANNUAL REPORT 1957. 1 Aug 58, 81p. 348 refs. NOLC rept. 426; NAVORD rept. 5930.
Order from LC mi$4.80, ph$13.80 PB 142 125

This is the first annual report to be published by the Naval Ordnance Laboratory Corona, which is engaged almost exclusively in scientific research and develop-

ment related to guided missiles. The primary purpose of the report is to summarize management information of interest to the Bureau of Ordnance and to identify improvements made during calendar year 1957 in effectiveness and economy of Laboratory operation. The report is also intended to inform other Laboratory fund sponsors and appropriate Fleet and Shore Establishments of the Laboratory's capabilities and role in the ordnance programs of the Department of the Navy and other Department of Defense activities. Since the report is unclassified, it contains only a brief general description of the Laboratory's technical program; this description is not intended and should not be regarded as an unclassified technical progress report for the Laboratory.

Picatinny Arsenal, Dover, N. J.
IMPROVEMENT OF BLANK AMMUNITION, by E. Jescerzewski. Mar 59, 77p. Technical rept. DB-TR:2-59.
Order from LC mi$4.50, ph$12.30 PB 142 052

A procedure was established for renovating Blank Ammunition requiring minor design modifications. It is considered that present stocks of cartridges will be improved considerably. The procedure consists of: (1) removal of the old closing cup assembly and bagged black powder charge; (2) replacement with loose potassium nitrate black powder, a fiberglass wad, and a polystyrene closing cup.

Massachusetts Inst. of Tech., Cambridge.
CORRECTION OF EPOCH ERROR IN CIRCULAR ORBITS. PART II. CORRECTION BY NON-TANGENTIAL TRANSFER, by Lawrence J. Berman. Rept. on Contract AF 49(638)363. 30 Apr 59, 39p. 2 refs. AFOSR TN-59-62, Pt. 2; AD-214 637.
Order from LC mi$3.00, ph$6.30 PB 142 191

A vehicle in a circular orbit is transferred into a second orbit by impulsive thrust. At some subsequent intersection of the 2 orbits, a second impulse is applied to transfer it back to the original orbit. In general, the average angular velocity in the transfer orbit will differ from that in the circular orbit, and the epoch of the body will be changed by such a maneuver. This maneuver is studied with a goal of determining what conditions affect the choice of the transfer orbit. In particular the time taken for completion of the epoch change and the characteristic velocity required are studied. Finally it is shown that the imposition of a restriction on the minimum perigee radius considerably modifies the choice and even makes some conditions impossible to satisfy.

Picatinny Arsenal, Dover, N. J.
AUTOMATIC PRIMER FLASH HOLE CHECKER, by W. C. Sweney. Apr 59, 13p. Technical rept. DE-TR:1-59.
Order from LC mi$2.40, ph$3.30 PB 142 047

This project was undertaken to design and construct a device (for installation on a manual loading line) for use immediately prior to the insertion of the foiling paper in the primer body.

Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N. J.
PYROELECTRIC EFFECTS IN LUCKY CIRCUITS, by L. William Doremus. Jan 57, 19p. Technical rept. 2377.
Order from LC mi$2.40, ph$3.30 PB 139 441

The object was to study the pyroelectric effect in Lucky (barium titanate) compositions in terms of (a) its possible usefulness in fuze systems, and (b) its significance as a hazard in connection with the use of Luckies in Ordnance fuzing.

Watertown Arsenal Labs., Mass.
TRANSIENT ABLATION OF WOOD'S ALLOY, by C. W. Semple. Rept. on Research of Materials for High Temperature Uses. May 59, 21p. 9 refs. WAL TR 786.1/1; AD-215 119.
Order from LC mi$2.70, ph$4.80 PB 142 114

Projectiles with Wood's Metal inserts were fired into standard atmosphere at muzzle velocities from 2600 to 6000 fps. The ablation rate varies approximately as the instantaneous velocity raised to the 3.75 power.

Zahorski Engineering, Inc., Santa Barbara, Calif.
HETEROGENEOUS CONSTRUCTION FOR MISSILE FUSELAGES, by Adam T. Zahorski. Rept. on Contract AF 33(616)5519. Nov 58, 136p. 33 refs. WADC Technical rept. 58-513; AD-207 270.
Order from OTS $2.75 PB 151 881

The study program described herein deals with the analytical prescription for, and the preliminary design synthesis of new type fuselage structures, termed "Heterogeneous Structures" which have inherent in their design a potential weight advantage, low cost of fabrication and functional accessibility over conventional semi-monocoque structures. Investigations have shown that realistic structural weight savings of appreciable magnitude can be achieved, particularly in the design of missile fuselages where aero-dynamic heating is an important factor. A structural model of a proposed full-size prototype heterogeneous fuselage has been fabricated and subjected with satisfactory results, to burst, bending, and supersonic wind tunnel tests. A full-size fuselage section intended for comparative evaluation against a current conventionally designed structure has been designed and shows a weight saving of the order of 45%. Specifications for the fabrication of such prototype fuselages are also given.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

[Army] Engineer Research and Development Labs., Fort Belvoir, Va.
INVESTIGATION OF TRANSPORTATION HAZARDS, by Mart I. Fowler. 28 Aug 53, 44p. 13 refs. Rept. on Project 8-91-06-002.
Order from LC mi$3.30, ph$7.80 PB 139 602

This report presents a survey of the hazards of transportation encountered in rail, air, water, and truck shipments, study and recommendation of the same. This survey evolves from a desire to identify and isolate the actual hazards of transportation; to compare these hazards with the laboratory tests being conducted at the Packaging Development Laboratory of the Engineer Research and Development Laboratories.

Michigan State U., East Lansing.
CONTROL OF STORAGE ROT OF POTATOES BY GAMMA RADIATION, by W. J. Hooker, D. R. Isleib and D. T. Duncan. Rept. no. 10 (Final) for 5 Nov 56-30 June 58 on Contract DA 19-129-qm-291. [1958] 47p. 17 refs. QFCIAF File no. 5-558.
Order from LC mi$3.30, ph$7.80 PB 142 318

Exposure of potato tubers to ionizing irradiation predisposed tubers to rot. Predisposition to rot was greatest at high levels of irradiation and was gradually reduced as irradiation intensity was reduced. Rot incidence was increased following wound inoculation with bacterial soft rot and with Fusarium dry rot. Predisposition to rot was increased at all irradiation intensities tested. The effect was most pronounced at higher levels of irradiation intensity. Irradiation intensities of 45 kilorep were inhibitory to Erwinia carotovora. Spores or young colonies of Fusarium sambucinum were equally sensitive to irradiation. Isolates of Fusarium spp. made from irradiated tuber tissue which has been naturally infected were often highly pathogenic to both non-irradiated and irradiated tissue. Cell membrane permeability of tuber tissue increased following exposure to ionizing irradiation. The response was greatest at high levels of irradiation. Periderm formation was progressively inhibited by increasing dosages from 2.5 to 15 kilorep. Periderm inhibition was more pronounced when tubers were wounded before irradiation than when wounded after irradiation.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge.
STATIC AND DYNAMIC LOAD, STRESS, AND DEFLECTION CYCLES IN SPUR-GEAR SYSTEMS, by Herbert H. Richardson. Rept. for 1 Feb 56-30 June 58 on Contract DA 19-020-ORD-3697. 30 June 58, 119p. 53 refs. D.A.C.L. Research memo. R.M. 7454-1.
Order from LC mi$6.00, ph$18.30 PB 142 343

Curves, data, and equations are given which permit computation of the static load, stress, and deflection cycles for any gear system, real or proposed. The effects of nonlinear elasticity, elastic deformation during load transfer, manufactured errors and friction are included in the analysis, and the results of the analysis are verified by comparison with measured stress cycles for actual gears.

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION INTO APPLICABILITY OF UNIT COOLER FAN ON UNIT HEATER, by M. Belkin and A. T. Rudolph. Final rept. 3 July 57, 20p. 10 refs. Lab. project 5565-4; AD-145 800.
Order from LC mi$2.40, ph$3.30 PB 142 107

An investigation was conducted to determine the feasibility of standardizing one type of fan for coils for unit heaters and coolers so as to reduce the supply and cost problem. The fan which is proposed for both uses has the motor located in a position which puts it next to the heating coil of a unit heater. An investigation was therefore conducted to determine the effects of radiant and convective heat from the unit heater coil upon the fan motor. It is feasible to use a fan of the type investigated for both unit heaters and unit coolers.

Engines and Propulsion Systems

Armour Research Foundation [Chicago, Ill.]
DEVELOPMENT OF NEW SOUND ABSORBING MATERIALS FOR NOISE SUPPRESSORS. PART I. DEVELOPMENT OF EQUIPMENT FOR EVALUATING ACOUSTICAL AND DURABILITY PROPERTIES OF SOUND ABSORBING MATERIALS AT ELEVATED TEMPERATURES, by William E. Lawrie. Rept. for 1 Mar 57-31 July 58 on Contract AF 33(616)5060. June 59, 74p. 2 refs. WADC Technical rept. 58-460, Pt. 1; AD-215 445.
Order from OTS $2.00 PB 151 907

This report describes the development of equipment and techniques for the measurement of high temperature acoustical and mechanical properties of absorbing materials for use in aircraft engine test cells. An acoustical impedance tube has been constructed to determine the high temperature acoustical properties and the necessary techniques developed to obtain accurate measurements in the presence of the temperature distribution found in the tube. In addition, a test cell has been constructed that simulates the environment to which the acoustical materials will be exposed. This cell will be used to determine the appropriate mechanical properties of acoustical materials to ascertain that the materials will withstand the environment of the aircraft engine test cells.

Armour Research Foundation, Chicago, Ill.
LIGHTWEIGHT STRUCTURES AND PRESTRESSED LAUNCHER COMPONENTS. PHASE REPORT I: STUDY OF METHODS, by R. L. Barnett. Rept. for 25 Mar-25 Sep 57 on Contract DA 11-070-508-ORD-588. Jan 58, 164p. 49 refs.
Order from LC mi$7.80, ph$25.80 PB 142 133

The treefold purpose of this report is: (1) to establish design techniques for lightweight tension, compression, and bending members, (2) to investigate some of the aspects of prestressing elastic structures, and (3) to analyze the Honest John Rocket Launcher, XM33, for deflections.

Armour Research Foundation, Chicago, Ill.
LIGHTWEIGHT STRUCTURES AND PRESTRESSED LAUNCHER COMPONENTS, PHASE REPORT II: MODEL TESTING, by R. L. Barnett. Rept. for 25 Sep 57-23 Aug 58 on Contract DA 11-070-508-ORD-588. Oct 58, 121p. 27 refs.
Order from LC mi$6.30, ph$19.80 PB 142 134

This report describes an experimental effort which was conducted to verify, to demonstrate, and to extend the results and contentions set forth in Phase Report I (PB 142 133) of this contract. It was experimentally established that a weight saving of about 70% could be effected in the Little John launcher beam by using an equal depth, optimum-taper, segmented titanium carbide beam. Furthermore, techniques are suggested to increase this saving. An optimum beam designed with a solid prismatic web was shown to be superior to an optimum beam of the same depth with a perforated web when both are designed for stiffness. The deflection under a moving concentrated line load on a simply supported steel I-beam was demonstrated to be less than the corresponding deflection with an equal weight, equal depth, prestressed steel truss beam. Some of the unusual properties of segmented structures are described in this report.

Army Rocket and Guided Missile Agency, Redstone Arsenal, Ala.
A GRAPHICAL SOLUTION FOR SOLID-PROPELLANT MOTOR DESIGN, by Robert N. Witte. Jan 59, 29p. Rept. no. 6R15.
Order from LC mi$2.70, ph$4.80 PB 142 105

A graphical method for the design of solid-propellant motors is discussed. Only one grain configuration is investigated; however, the procedure proposed could be employed for any configuration. Estimates of motor weight and percent silver are included as well as a sample calculation.

Arnold Engineering Development Center, Tullahoma, Tenn.
SPREADING OF ROCKET EXHAUST JETS AT HIGH ALTITUDES, by E. K. Latvala. Rept. on Contract AF 40(600)700. June 59, 37p. 5 refs. AEDC-TR-59-11; AD-215 866.
Order from LC mi$3.00, ph$6.30 PB 142 330

The results of an experimental and theoretical investigation of axisymmetric sonic and supersonic nozzles exhausting into still air are presented. The tests were conducted using nozzles having exit Mach numbers of 1.0 to 5.0 and with gases having specific heat ratios of 1.3, 1.4, and 1.667. Ratios of nozzle exit pressure to ambient pressure ranging as high as 8900 were obtained.

David Taylor Model Basin, Washington, D. C.
THE DESIGN AND PERFORMANCE OF SUPERCAVITATING PROPELLERS, by A. J. Tachmindji, W. B. Morgan and others. Feb 57, 38p. 9 refs. Rept. C-807.
Order from LC mi$3.00, ph$6.30 PB 142 161

A design method for supercavitating propellers is outlined and results of a number of tests are presented. Evaluation of the results shows that supercavitating propellers are feasible as a propulsion device for high-speed craft.

Delaware U., Newark.
STUDY OF FLOW AND REACTION RATES IN TURBULENT FLAMES, by R. P. Barbor, J. D. Larkin and others. Rept. on Contract Nonr-1858(25). Dec 57, 40p. 39 refs. Proj. Squid Technical rept. DEL-8P.
Order from LC mi$3.00, ph$6.30 PB 137 454

With the primary objective of finding whether determination of reaction rates as a function of position within the flame is a feasible approach to the problem of turbulent flame propagation, measurements of static and impact pressures and of chemical composition were made in the burning zones of two simulated ramjet combustion chambers. It was found from a study of the atmospheric flame that the chemical composition of the gas samples was a function of the velocity of the gases entering the sampling probe, and it was concluded that this variation is due to sampling a stream of varying density. Analyses of samples from both flames showed that within experimental error the compositions are a function of oxygen content only. The data were used to determine reaction rates as a function of position within the combustors. Values of reaction rate plus turbulent diffusion, or reaction rate calculated with the assumption that turbulent diffusion is negligible, showed that the rate of reaction is a function of fractional completion of combustion and of position within the flame. It was concluded that the method of attack used in this work is a reasonable approach to the problem of turbulent flame propagation, having a special advantage in that it can be used to relate the rate of reaction to the patterns of the mean flow which may change markedly through the burning zone.

Fairchild Engine Div., Deer Park, N. Y.
A DETONATION WAVE HYPERSONIC RAMJET, by W. H. Sargent and R. A. Gross. Rept. on Contract AF 49(638)15. June 59, 47p. 14 refs. AFOSR-TN-59-589; AD-216 811.
Order from LC mi$3.30, ph$7.80 PB 142 244

This report examines the performance of a hypersonic ramjet having a detonation wave combustion process. Flight speeds from Mach 2.5 to 10 are examined. Engine performance characteristics are presented and compared with those of a conventional ramjet.

Naval Air Rocket Test Station, Lake Denmark, Dover, N. J.
ANALYTICAL PROCEDURES FOR ROCKET PROPELLANTS. VI. WHITE FUMING NITRIC ACID, by John D. Clark. June 52, 44p. 23 refs. Rept. no. 20.
Order from LC mi$3.30, ph$7.80 PB 142 118

Procedures are described for the chemical analysis of white fuming nitric acid (WFNA) to determine: Total

acid as HNO_3. .Oxides of nitrogen as NO_2. Actual nitric acid, and Water.

Picatinny Arsenal, Dover, N. J.
PRODUCTION ENGINEERING AND IMPROVEMENT OF IGNITER FOR 3.5 INCH ROCKET M28A2, M29A2 AND M30, by W. C. Montross. Apr 59, 15p. 5 refs. Technical rept. DC-TR:3-58.
Order from LC mi$2.40, ph$3.30 PB 142 218

Manufacturing Equipment and Processes

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
AGGREGATION OF VARIABLES IN DYNAMIC SYSTEMS, by Herbert A. Simon and Albert Ando. ONR Research memo. no. 31 (Revised) on Planning, and Control of Industrial Operations, Contract Nonr-760(01). Dec 56, 33p. 5 refs.
Order from LC mi$3.00, ph$6.30 PB 137 390

The general Walrasian system and its more modern dynamic extensions are relatively barren of results for macroeconomics and economic policy. Hence, in our desire to deal with such questions we use highly aggregated systems by sheer necessity, often without having much more than the same necessity as our justification Perhaps the most important result to date for justifying aggregation under certain circumstances is the Lange-Hicks conditions.

Frankford Arsenal, Philadelphia, Pa.
EFFECT OF IRON ON ALUMINUM DIE CASTING ALLOY, by L. M. Smith. Feb 59, 19p. Technical rept. no. R-1498.
Order from LC mi$2.40, ph$3.30 PB 142 159

The ductility as measured by per cent elongation, was significantly lowered by increasing the iron content. Tensile strength changes varied from a loss of 5 per cent to a gain of 4 per cent. Yield strengths increased up to 7 per cent.

Harnischfeger Corp. [Milwaukee, Wis.]
EFFECT OF MOISTURE IN COVERINGS OF LIME-FERRITIC LOW-HYDROGEN ELECTRODES IN THE WELDING OF ARMY ARMOR AND STUDY OF MOISTURE DETERMINATION METHODS, by W. G. Rinehart, D. C. Smith, and K. P. Johannes. Final rept. no. WAL TR 640/215-15; AD-216 460.
Order from LC mi$4.50, ph$12.30 PB 142 428

Effect of electrode covering moisture on weld-joint cracking and rates of moisture absorption and methods of reconditioning wet electrodes for various electrode sizes, 5/32", 3/16" and 1/4". There are factors other than the electrode covering moisture content which are just as important to the weld-joint cracking problem.

Hupp Electronics Co., Carlisle, Pa.
MANUFACTURE OF CR-47/U CRYSTAL UNITS 327.788 and 500.000Kc; APPLICABLE SPECIFICATIONS MIL-C-3098A, PMD-6C. Process manual, completion rept. step 1. Rept. on Contract DA 36-039-sc-66090. [1957] 32p.
Order from LC mi$3.00, ph$6.30 PB 137 420

It has become apparent that all steps and techniques used throughout the manufacture of these units must be accurately controlled both as to precision of mechanical tooling as well as to the reproducibility of operator performance.

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF SOLIDIFICATION OF HIGH STRENGTH STEEL CASTINGS UNDER SIMULATED PRODUCTION CONDITIONS. Final rept. on Contract DA 19-020-505-ORD-4511. 1 July 58, 59p. 33 refs.
Order from OTS $1.50 PB 151 753

Effects of solidification variables on the structure and properties of high strength cast 4330 alloy steels. Cooling rates and thermal gradients during solidification were varied. Tensile and yield strengths were essentially constant in all plates, but large variations in elongation and reduction of area properties were obtained depending on solidification conditions. These differences were attributed to differences in (1) microporosity, (2) microsegregation, and (3) inclusion size and distribution.

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FOUNDRY CHARACTERISTICS OF A RAMMED GRAPHITIC MOLD MATERIAL FOR CASTING TITANIUM, by H. W. Antes, J. T. Norton and R. E. Edelman. Jan 58, 29p. 5 refs. Rept. no. R-1432.
Order from LC mi$2.70, ph$4.80 PB 142 322

The surface finish, shrinkage, compression strength, permeability, and thermal conductivity of an expendable graphitic mold have been determined. The amount of surface contamination of titanium cast into this type of mold has also been ascertained. All the variables were studied as functions of the molding pressure and moisture content of the graphitic material. The material fabricated with 6 per cent (by weight) of water and compacted at 123 psi pressure provided a satisfactory mold into which molten titanium could be cast.

Stanford U., Calif.
A NOTE ON THE MALINVAUD THEOREM, by Hirofumi Uzawa. Technical rept. no. 53 on Contract N6onr-25133. 15 May 58, 8p. 4 refs.
Order from LC mi$1.80, ph$1.80 PB 139 449

The problem whether a production-consumption programme over time is efficient or not was analyzed by E. Malinvaud in great detail. One of the fundamental propositions established by him is the existence over time of the price system associated with an efficient programme. His proof of the proposition, however, contains a point of ambiguity; namely, the price sys-

tem $(p_1, \ldots, p_h)$, is not necessarily identical with the first h components of the price system $(p_1, \ldots, p_h, \ldots, p_k)$, $k > h$. In this note, the existence of the price system over time will be proved in appealing to the theory of programming in general spaces, recently developed by L. Hurwicz in Cowles Commission Discussion Papers.

Watertown Arsenal Labs., Mass.
METAL-ARC WELDED Ti-6Al-4V, Ti-4Al-4V, and Ti-5Al-2 1/2Sn TITANIUM ALLOYS, by Daniel M. Dailey, Jr., and Carl E. Hartbower. May 59, 21p. 3 refs. Technical rept. WAL TR 401/250-1; AD-214 007.
Order from LC mi$2.70, ph$4.80 PB 142 427

An investigation has been made of the weldability of three commercial heats of titanium: one all-alpha and two alpha-beta alloys. Weldability was evaluated on the basis of tensile and notched-bar impact tests on welds made with the inert-gas-shielded consumable-electrode process.

Transport, Traction and Hoist Facilities

Aberdeen Proving Ground, Md.
INVESTIGATION OF KNOWN MATERIALS FOR USE AS ANTIFREEZE COMPOUND AND INHIBITORS (TERTIARY MIXTURES OF HYDROXY COMPOUNDS). Rept. no. 3 on Coolants, Automotive Engine and Heat Transfer Media, Ordnance Proj. TB5-8010. 28 June 51, 63p. 7 refs. Lab. Service Div. rept. no. 139.
Order from LC mi$3.90, ph$10.80 PB 142 175

Freeze points of glycol mixtures, glycol milture solutions, were made and where warranted, viscosities were determined. The systems, ethylene glycol-water-n-butanol; ethylene glycol-water-MME; ethylene glycol-water-carbitol and propylene glycol-water-methyl cellosolve, were studied as to freeze points and viscosities and a pattern of behaviour was established from which mixtures of merit as arctic type coolants may be predicted.

Columbia U., New York.
AIR TRANSPORT IN MADAGASCAR, by William A. Hance. Rept. on Contract Nonr-266(29). [1958] 5p. 5 refs.
Order from LC mi$1.80, ph$1.80 PB 139 374

Air transport, plays a significant part in Madagascar communications, speeding movement between the more important centers, filling in the transport map where roads and rail lines are not as yet adequately provided.

Columbia U., New York.
THE PORTS OF MADAGASCAR. Rept. on Contract Nonr-266(29). [1958] 34p. 45 refs. AD-153 274.
Order from LC mi$3.00, ph$6.30 PB 139 377

Madagascar has a relatively small tonnage traffic in international trade and a fairly important coastwise movement. Traffic is rather highly concentrated in six or seven ports of which Tamatave is outstanding in importance. Installations are inadequate and outmoded, and the coastlines are generally inhospitable. Economic and physical difficulties have prevented the installation of modern ports and port facilities. There is not one fully adequate deep water berth on the island; only 3 ports nominally have such berths, and most ports are inadequately protected open roadstead lighterage installations. The level of activity justifies better facilities at some of the ports, especially Tamatave and Majunga.

Cornell U. Medical Coll., New York.
STUDY OF CRASH INJURY PATTERNS AS RELATED TO TWO PERIODS OF VEHICULAR DESIGN. A COMPARATIVE STUDY OF ACCIDENT AND INJURY FACTORS IN 1940-49 AUTOMOBILES AND 1950-54 AUTOMOBILES, by John O. Moore, Boris Tourin, and John W. Garrett. Technical rept. 4 on Contract DA 49-007-md-483. Mar 55, 24p. 7 refs.
Order from LC mi$2.70, ph$4.80 PB 140 969

Herein analyzed are accident and injury data on 417 automobiles involved in injury-producing rural accidents during 1953 and 1954 and selected by controlled sampling techniques. The data are analyzed to compare cars manufactured from 1940 to 1949 with cars manufactured from 1950 to 1954 to determine whether "newer" cars produce more or less injury than "older" cars in injury-producing accidents. Thus, the data in this report show that 15 years of passenger automobile design have, at best, produced no advance in "crashworthiness" or decrease of traumatic effects when injury-producing accidents occur.

Dunlap and Associates, Inc., Stamford, Conn.
HUMAN FACTORS PROBLEMS AFFECTING MERCHANT SHIP NAVIGATION SAFETY: A PRELIMINARY INVESTIGATION. Rept. on Contract MA-1745. June 59, 146p. 23 refs.
Order from OTS $2.75 PB 151 765

Three phases of work were undertaken: (1) a preliminary investigation of current practices; (2) identification of requirements for ship navigation (current and future) based on discharge of necessary functions within the known capabilities and limitations of humans; and (3) development of recommendations for elements of shipboard systems that might be subsequently submitted to a design agent or an equipment development contractor for conversion into prototypes suitable for in-service testing.

MATERIALS

Naval Photographic Interpretation Center, Washington, D. C.
RELATIVE ORIENTATION OF TWO OVERLAPPING

PHOTOGRAPHS, by Everett L. Merritt. 20 Apr 51, 12p. Rept. no. 109-51-U.
Order from LC mi$2.40, ph$3.30 PB 142 277

Photogrammetric control extension by analytical means is a synthesis of the equations described here and those described in the previous three sections. A rigorous solution is developed here that is of academic value only, owing to the length of the computation. The length of the solution justifies the employment of an iterative solution also described in this exterior orientation series.

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL RADIATION DAMAGE TO CELLULOSE MATERIALS. PART III. IGNITION OF ALPHA CELLULOSE BY PULSES SIMULATING NUCLEAR WEAPON AIR BURSTS, by S. B. Martin and W. Lai. 28 May 58, 37p. 7 refs. Research and Development technical rept. USNRDL-TR-252; AFSWP-1082.
Order from LC mi$3.00, ph$6.30 PB 142 177

The ignition behavior of blackened alpha-cellulose exposed to the generalized nuclear weapon (air burst) pulse is detailed for a wide range of simulated weapon yield. As in the case of square-wave exposure, the data are correlated to a single ignition behavior pattern using grouped parameters derived from considerations of diffusion of heat. The behavior when exposed to the two input types is seen to be quite similar. However, no simple equivalence expression results as in the case of charring. Equivalent effects are observed for weapon pulses having peak irradiances about three times the irradiance level of the square-wave input. Sustained flaming ignition requires up to 40 percent less energy and sustained glowing requires up to a third more energy when delivered in the form of the weapon pulse.

Ceramics and Refractories

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
DUCTILE-BRITTLE TRANSITION IN THE REFRACTORY METALS, by F. R. Schwartzberg, H. R. Ogden and R. I. Jaffee. Rept. on Contract AF 18(600)1375. 25 June 59, 76p. 58 refs. DMIC Rept. 114; AD-216 526.
Order from OTS $2.00 PB 151 070

Ductile-brittle transition behavior occurs in the body-centered cubic refractory metals columbium, molybdenum, tungsten, and chromium. The available data for vanadium suggest that brittleness at low temperatures is attributable to low-strain-rate hydrogen embrittlement. However, the occurrence of ductile-brittle transition behavior is not precluded. No brittle transition has yet been found in tantalum. Transition temperature can be greatly influenced by testing and material conditions. As a general rule, the following factors increase the temperature at which the brittle transition occurs: (1) recrystallization, (2) decreasing amounts of cold work, (3) increasing grain size, (4) increasing interstitial content, (5) increasing strain rate, and (6) introduction of triaxial stresses. The transition from ductile to brittle behavior is associated with a rapid rise in yield strength occurring with reductions in temperature. Brittle behavior is observed to occur when the yield strength equals the fracture strength. Cottrell's theory of dislocation locking by interstitial atoms is generally used to explain the yield-strength rise at low temperatures.

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
INVESTIGATION OF HIGH TEMPERATURE RESISTANT MATERIALS, by C. R. Mason and J. D. Walton. Summary rept. no. 2, 1 Nov 57-31 Oct 58, on Contract NOrd-15701. [1958] 113p.
Order from LC mi$6.00, ph$18.30 PB 142 326

Effects of particle size and substrate temperature on adherence of flame-spray coatings on mild steel using a powder containing 85 per cent zirconia and 15 per cent titania. Two materials were investigated as possible base coats for flame-sprayed alumina. Coatings produced from flame-sprayed titania showed excellent room temperature adherence. (See also PB 139 926.

Northrop Aircraft, Inc., Hawthorne, Calif.
THE STABILITY OF REFRACTORY ELEMENTS AND COMPOUNDS IN A HYDROGEN ATMOSPHERE AT ELEVATED TEMPERATURES, by L. A. Ohlinger. Rept. on the Stability and Refractory Elements and Components in a Hydrogen Atmosphere at Elevated Temperatures. 13 Aug 48, 20p. 7 refs. Rept. no. NRR-163; NEPA-736-NOR-52; AD-145 603.
Order from LC mi$2.40, ph$3.30 PB 137 344

Ohio State U. Research Foundation, Columbus.
NiAl - ALUMINA CERMETS, by W. C. Leslie. Rept. no. 57 on Contract W33-038-ac-14217. Oct 50, declassified 22 Apr 58, 28p. 5 refs. AF Technical rept. 6087; ATI-90 060.
Order from LC mi$2.70, ph$4.80 PB 142 043

Preparation and the properties of cermets composed of the intermetallic compound NiAl and alumina. Tests to determine the optimum sintering conditions, the effect of surface oxidation, the oxidation resistance and stress rupture in bending the cermet.

Fuels, Lubricants, and Hydraulic Fluids

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
REVIEW OF THE USE OF SODIUM TETRABORATE AS A CORROSION INHIBITOR FOR HYDRAULIC BRAKE FLUIDS, by Charles B. Jordan. 6 May 59, 7p. 12 refs. CCL # 76.
Order from LC mi$1.80, ph$1.80 PB 142 247

The object of this report is to collect the results of many investigations conducted at this laboratory involving the use of sodium tetraborate as a corrosion inhibitor for polar hydraulic brake fluids and their components.

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
EXPLORATORY TRIAL OF THE ABEL TEST FOR DETECTION OF PROPELLANT DETERIORATION, by Norman E. Beach and Rudolf W. Velicky. June 59, 28p. 2 refs. Technical memo. no. GL-7-59.
Order from LC mi$2.70, ph$4.80 PB 142 046

Eight lots of single, double and triple-base propellants were submitted to the Abel Test (U. K. method) and the Abel-Quick Test, in which the potassium iodide-starch paper was replaced by a strip of Propellant Quick Test paper (diphenylamine/sulfuric acid reaction). Compositions M6, IMR, M2, M9, M15 and T28 were covered; and the samples tested came from ambient storage and from elevated temperature storage at 122°F., 150°F., and 176°F., for various periods.

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
SURVEILLANCE OF PROPELLANTS, by Norman E. Beach. Oct 58, 39p. 4 refs. Technical memo. no. GL-2-58.
Order from LC mi$3.00, ph$6.30 PB 140 921

This project was established for the purpose of evaluating the stability of field-stored propellant which field tests showed to be non-standard. Of particular interes was the matter of available stabilizer content in such propellants. Improvement on the determination of available stabilizer content in aged propellant was undertaken in the investigative phase of the project.

General Electric Co., Schenectady, N. Y.
RESEARCH ON LIQUID METALS AS POWER TRANSMISSION FLUIDS, by Robert C. Kumpitsch. Rept. for May 57-Sep 58 on Secondary Power Components and Materials, Contract AF 33(616)3698. May 59, 196p. 46 refs. WADC Technical rept. 57-294, Pt. 2; AD-214 694.
Order from OTS $3.00 PB 151 876

The behavior of liquid metal NaK-77 (a eutectic alloy of sodium 23% by weight and potassium 77% by weight) as a hydraulic fluid. NaK-77 was observed over a temperature range of 80 to 1000°F and at cyclic pressures of 15 and 3000 psia. An evaluation is made of several types of static seals to determine their effectiveness in NaK-77. Results of materials compatibility tests conducted with friction and wear test equipment in NaK-77 at 1000°F.

Gulf Oil Corp., Philadelphia, Pa.
INVESTIGATION OF THE PERFORMANCE OF RESIDUAL TYPE FUELS BURNED AT ATMOSPHERIC PRESSURES FOR ADAPTABILITY TO GAS TURBINE USE. Final rept. on Contract NObs-61677. 30 Sep 57, 189p. 4 refs. Refinery Tech. Lab. rept. no. RTL-305.
Order from LC mi$8.40, ph$28.80 PB 140 961

I. Gas turbine blade corrosion tests in ten-inch combustor rig operating at atmospheric pressure. II. Micro-burner corrosion tests at Gulf Research and Development Company. III. Correlation between micro-burner and ten-inch atmospheric combustor. A great deal of data, tables and graphical interpretation is presented.

Little, Arthur D., Inc., Cambridge, Mass.
METHODS OF REMOVING WATER FROM AVIATION FUELS. Rept. on Contract NOas-56-986. 1 Dec 58, 90p. 18 refs.
Order from LC mi$4.80, ph$13.80 PB 142 320

Various methods for removing free and dissolved water from JP-5 aviation fuels have been critically evaluated.

Princeton U., N. J.
STABILITY OF PROPELLANTS AND THE THEORY OF THERMAL IGNITION, by Irvin Glassman. Technical rept. on Contract AF 18(600)1527. May 59, 21p. 12 refs. Aeronautical Engineering Lab. rept. no. 460; AFOSR TN-59-586; AD-217 185.
Order from LC mi$2.70, ph$3.30 PB 142 016

The substance of this report was given as extemporaneous remarks at the Fourth Monopropellant Symposium sponsored by the Bureau of Aeronautics, Department of the Navy, on May 5 and 6, 1959, in New York City.

Rock Island Arsenal Lab., Ill.
DIMETHYLDIOTADECYL AMMONIUM BENTONITE AS A THICKENER FOR AUTOMOTIVE AND ARTILLERY GREASE, by Max T. Fisher. 7 May 59, 36p. 8 refs. Rept. no. 59-1254; AD-215 940.
Order from LC mi$3.00, ph$6.30 PB 142 109

Better heat stability, availability, and uniformity, are advantages of certain non-soap thickeners over conventional soap thickeners for grease. The elimination of a major defect, poor salt spray corrosion resistance, without adversely affecting other properties, could result in a less critical and possibly superior grease meeting Specification MIL-G-10924A. Of the resins, polymers, silicas and clay materials screened, two dimethyldioctadecyl ammonium bentonites yielded greases that most nearly met the requirements of the specification. Fatty acid esters of sorbitol, lauroyl and stearoyl sarcosines, and a barium sulfonate were incorporated in the bentonite greases at various concentrations and their effect on salt spray resistance and other properties were determined. Sorbitan monooleate and stearoyl sarcosine in 1.5% concentration were effective salt spray corrosion inhibitors in the bentonite greases formulated and have little adverse effect on their structural stability. It was found, however, that storage at low relative humidity and the resulting loss of water of composition caused severe shear breakdown of these greases. Since no suitable substitute has been found for water for stabilizing dimethyl-

dioctadecyl ammonium bentonite greases of the MIL-G-10924A type, storage or use in arid environments would be inadvisable. (Author)

Leather and Textiles

Fabric Research Labs., Inc. [Boston, Mass.]
DEVELOPMENT OF IMPROVED NYLON WEBBINGS, by Chauncey C. Chu, Ernest R. Kaswell and Donald J. Doull. Rept. for 31 Dec 56-31 Aug 58 on Air Force Textile Materials, Contract AF 33(600)34381. Apr 59, 74p. 2 refs. WADC Technical rept. 58-509; AD-211 911.
Order from OTS $2.00 PB 151 861

In general, methods of extending the useful service life of Air Force webbings have been limited to resin treatments which improve abrasion resistance. Little attention has thus far been paid to the influences of structural geometry on webbing performance. This project was aimed at a study of these influences. Thirty-two experimental webbings, woven from nylon type 6 Caprolan yarns, meeting the general dimensional requirements of Specification MIL-W-4088B Type XIII webbing, were designed and constructed. These webbings, containing systematic variations in constructional geometry, were thoroughly evaluated. Unfortunately the design for maximum original strength does not coincide with the design for maximum abrasion resistance. Thus the design of an improved webbing must be a compromise between high initial strength and high abrasion resistance. Six optimum experimental webbing constructions have been proposed, but have not been constructed or evaluated in this program.

Quartermaster Research and Engineering Center, Natick, Mass.
WIND PENETRATION THROUGH FABRIC SYSTEMS, by G. F. Fonseca, J. R. Breckenridge and A. H. Woodcock. Mar 59, 22p. 10 refs. Technical rept. EP-104.
Order from LC mi$2.70, ph$4.80 PB 142 312

The effect on heat loss of wind penetration into fabric systems was investigated using cylinders capable of measuring total and local heat transfer coefficients. The effects of both the permeability of the outer windbreak layer and the design of the underlying layers were investigated. It was found that two relatively air-permeable windbreak layers with a space between them could be equally or more effective than a single fabric layer of low permeability. It was also shown that, with certain arrangements of fabrics, local cooling on the windward side may be extremely great even though total cooling does not appear excessive.

Paints and Finishes

[Material Lab.], New York Naval Shipyard, Brooklyn.
STUDY OF HOLDING STRENGTH OF RESIN DIPPED METAL FASTENERS IN WOVEN ROVING LAMINATE, by D. H. Kallas. Final rept. 9 Feb 59, 6p. 5 refs. Lab. Project 5993.
Order from OTS $0.50 PB 151 752

Comparison of results for resin dipped fasteners with results for undipped fasteners showed that the effect of resin dipping varied for different types of fasteners, for different sizes of fasteners and for different depths of penetration.

Rock Island Arsenal Lab., Ill.
DEVELOPMENT OF A FREEZE TEST FOR ZINC AND MANGANESE PHOSPHATING COMPOUND CONCENTRATES, by Donald H. Sale. 7 Apr 59, 23p. Rept. no. 59-949; AD-214 630.
Order from LC mi$2.70, ph$4.80 PB 142 110

The following test was developed because of the need for a means of determining the storage and shipping properties of liquid phosphate concentrates at low temperatures (freezing and below). Liquid zinc and manganese base phosphate compound concentrates were tested to determine the optimum temperature to be used in a freeze test. Prepared samples were subjected for a period of one week to each of the temperatures, 20°F, 10°F, 0°F, and -25°F. From the data obtained, the following freeze test was developed. The test material shall be conditioned to room temperature (65-80 F). A 40 ml sample shall be placed in a thick walled test jar (Schaar & Co. P1570 or equivalent). The sample shall be held at -25 ± 3 F for seventy-two hours for the zinc base compounds or 0 ± 3 F for seventy-two hours for the manganese base compounds after which the sample shall immediately be placed in a draft free room at 65° to 75°F for six hours. The sample shall be inverted three times at the end of each three hour interval during the warm up period. The sample shall be termed as acceptable if no precipitate or crystals remain at the end of the six hour warm up period. Varying amounts of each constituent in the concentrate are discussed with relation to their effects on the freeze test. (Author)

Plastics

Hughes Aircraft Co., Culver City, Calif.
RESEARCH ON HIGH TEMPERATURE POLYMERS, by John B. Rust and H. H. Takimoto. Technical rept. no. 1, 1 Mar-1 Sep 58, on Contract Nonr-2540(00).

[1958] 50p. 40 refs.
Order from LC mi$3.60, ph$9.30 PB 140 992

This covers the first six months work on a study of polysiloxymetalloxanes. The report describes the syntheses of organometallic intermediates and polymers, and the measurement of physical-chemical properties of the resulting materials. A literature survey and preliminary laboratory studies led to the selection of the oxides of titanium and aluminum as two of the more promising classes of compounds for initial investigation.

Material Lab., New York Naval Shipyard, Brooklyn.
EVALUATION OF WIRE ROPE WITH A PLASTIC CORE MANUFACTURED BY THE WIRE ROPE DIVISION OF THE JONES AND LAUGHLIN STEEL CORPORATION, MUNCY, PENNSYLVANIA. Final rept. 16 July 57, 24p. 4 refs. Lab. project 4750-23; AD-143 745.
Order from LC mi$2.70, ph$4.80 PB 142 106

Tests indicated that Plastikore rope meets the applicable specification requirements for wire rope, except for the material of the core. The preparation of satisfactory hot socketed connections to Plastikore rope requires that from 1/3 to 1/2 of the plastic core be allowed to remain in the socket. This procedure differs from the established procedure for hot socketing fiber core ropes, where the core is removed for the full length of the socket. There is relatively little difference between Plastikore rope and similar rope with a fiber core, under the conditions of test reported herein, with respect to: (1) tensile strength, (2) endurance life when operated over sheaves, (3) flexibility, and (4) effect of salt water immersion on core strength. Plastikore rope is somewhat less resistant to damage due to severe crushing and undergoes a slightly greater loss in strength when operated over sheaves than similar rope with a fiber core. Plastikore rope is appreciably more resistant to fungus growth than rope with a fiber core. Plastikore rope is considered to be suitable for use in the Naval service for those applications where the use of a plastic core in lieu of a fiber core would prove advantageous.

Naval Ordnance Lab., Corona, Calif.
ZIEGLER CATALYZED POLYVINYLCARBAZOLE, by D. L. Herring. 12 Sep 57, 14p. 5 refs. NOLC rept. 379; NAVORD rept. 4625; AD-143 468.
Order from LC mi$2.40, ph$3.30 PB 142 321

In an effort to prepare polyvinylcarbazole having an average molecular weight higher than that of the polyvinylcarbazole now available from commercial sources, 22 experiments were conducted. From the reaction between vinylcarbazole and $(C_2H_5)_3Al + TiCl_4$ at 80°C for 24 hours using a p-xylene as a solvent, a polymeric material having an average molecular weight estimated to be 60-70% of that of the commercially available polyvinylcarbazole was isolated in a near quantitative yield.

Battelle Memorial Inst., Columbus, Ohio.
EXPERIMENTAL STUDY OF THE MELTING AND GLASS TRANSITIONS OF ELASTOMERS, by R. M. Kell, D. G. McNulty and others. Final rept. on Contract DA 20-089-ORD-36702. 13 Jan 56, 43p. 22 refs. AD-92 651.
Order from LC mi$3.30, ph$7.80 PB 142 282

This report covers in detail the experimental procedures and results of an investigation of melting and glass transitions for isobutylene and chloroprene polymers. Data were obtained for these materials because of a particular need to enlarge upon information available up to the time of this study. It was found that raw, unstressed, polyisobutylene can be crystallized. So far as is known, this is the first such evidence to be reported. Several of the results observed should be of value in guiding future studies. Recommendations along this line have been made in the report.

Battelle Memorial Inst., Columbus, Ohio.
LITERATURE SURVEY OF THE MELTING AND GLASS TRANSITIONS OF ELASTOMERS, by Bailey Bennett, P. B. Stickney, and R. G. Heiligmann. Summary rept. on Contract DA 20-089-ORD-36702. 13 Jan 56, 71p. 97 refs. AD-84 049.
Order from LC mi$4.50, ph$12.30 PB 142 281

Very little data are available on the transition behavior of polymer blends. It has been demonstrated in at least one case that polymer blending can have a very small effect on the melting transition, however, the magnitude of these effects probably varies depending on the compatibility of the polymers. Blends may show glass transition temperatures corresponding roughly to those of the two individual polymers present. Presumably this is due to incomplete compatibility of the polymers. If compatibility were complete, it would be expected that glass transition temperatures would vary more or less uniformly with the composition of the blend.

Frick Chemical Lab., Princeton U., N. J.
STRESS RELAXATION STUDIES OF SCISSION IN RUBBER VULCANIZATES, by A. Mercurio and A. V. Tobolsky. Rept. on Contract Nonr-1858(07). 3 Apr 58, 11p. 11 refs. Technical rept. RLT-24.
Order from LC mi$2.40, ph$3.30 PB 139 458

The method of stress relaxation has been used to study oxidative scission in cross-linked rubbers of five different chain structures. Each chain structure was cross-linked by sulfur and by a non-sulfur containing agent. Among the sulfur cured vulcanizates the rate of scission varied very significantly with chain structure in spite of the presence of sulfur cross-links in each. On the contrary, for natural rubber, GR-S, and butyl rubber, the rates of scission of the sulfur cures were not very different from the corresponding sulfurless

cures. It was concluded that in these three cases the scission reactions occur predominantly along the network chains as opposed to scission at the cross-linked site.

International Latex Corp., Dover, Del.
DEVELOPMENT OF ELASTOMERS WITH IMPROVED PROPERTIES IN THE ABSENCE OF CARBON BLACK REINFORCEMENT, by Verle A. Miller, Edwin B. Gienger, Jr. and others. Six months progress rept. no. 2, 1 Jan-30 June 55, on Contract DA 44-109-qm-1778. [1955] 75p.
Order from LC mi$4.50, ph$12.30 PB 142 062

This contract covers two work phases: (I) Compounding and evaluation studies with various terpolymers directed toward applying these advances to mill compounded stocks. (II) The preparation and evaluation of other functional group-containing polymers directed toward an attempt to improve the strength and tear resistance of unreinforced synthetic rubbers by utilization of reversible secondary bonding forces or chemical reaction between various polar groups of the polymer chains. An increasing proportion of our research time is being spent on this phase. (See also PB 139 045)

Mohawk Rubber Co., Akron, Ohio.
STORAGE LIFE OF UNVULCANIZED RUBBER COMPOUNDS, by Frank M. Johnson. Final rept. on Contract DA 33-019-ORD-1890. 27 June 58, 29p. 9 refs.
Order from OTS $0.75 PB 151 643

The primary purpose of this program was to develop methods to determine the probable shelf life of tread rubber and repair materials. Numerous commercial samples of tread rubber, tread repair gum, padding stock, repair cushion, all-purpose gum, and tube repair gum were submitted to various accelerated aging conditions. These accelerated aging results were then compared to results obtained in long time storage at room temperature and at 100°F. All commercial samples tested are presented in coded form only, but tabulated data cover the results.

MATHEMATICS

Applied Mathematics and Statistics Lab., Stanford U., Calif.
ON CONDITIONAL EXPECTATION AND QUASI-RINGS, by M. V. Johns, Jr. and Ronald Pyke. Technical rept. no. 19 on Contract Nonr-225(21). 22 Sep 58, 16p. 5 refs.
Order from LC mi$2.40, ph$3.30 PB 142 270

Applied Mathematics and Statistics Lab., Stanford U., Calif.
ON THE DEGREE OF APPROXIMATION OF BERNSTEIN POLYNOMIALS, by Karel deLeeuw. Technical note no. 4 on Contract AF 49(638)294. 22 May 59, 26p. 8 refs. AFOSR TN-59-402; AD-214 522.
Order from LC mi$2.70, ph$4.80 PB 142 000

A question concerning the degree of approximation of a function by its Bernstein polynomials is studied. All functions are determined for which the degree is $O(\frac{1}{n})$. If the degree is $O(\frac{1}{n})$ on an interval, the function is shown to be linear on that interval.

Applied Mathematics and Statistics Lab., Stanford U., Calif.
UNATE TRUTH FUNCTIONS, by Robert McNaughton. Technical rept. no. 4 on Research in The Logical Design of Computing Machinery, Contract DA 04-200-ORD-436. 21 Oct 57, 19p. 2 refs. AD-146 373.
Order from LC mi$2.40, ph$3.30 PB 142 034

The paper contains some applications of rather elementary study of unate truth functions. One application is a method of deciding when a truth function is linearly separable, i.e., is expressible as a linear polynomial inequality in its arguments (letting 1 represent truth and 0 falsity). Other applications are to contact nets and to rectifier nets. Much of the material of the paper, although not in print, is well known to some logicians and switch theorists.

California U., Berkeley.
BOUNDS FOR THE FIRST EIGENVALUE OF A RHOMBIC MEMBRANE, by W. Hooker and M. H. Protter. Technical rept. no. 3 on Contract AF 49(638)398. Apr 59, 31p. 4 refs. AFOSR-TN-59-128; AD-210 616.
Order from LC mi$3.00, ph$6.30 PB 142 374

A new method for finding lower bounds for the first eigenvalue of elliptic equations is applied to the case of a rhombus. It is shown that a simple analytic expression can result due to Polya and Szego. In addition some refined upper bounds are obtained so that the exact value is confined to a narrow range for all angle openings. These results are useful in the application of the inclusion principle for lower bounds of arbitrary domains.

California U., Berkeley.
ON DIFFERENCE METHODS FOR THE SOLUTION OF A PARTIAL DIFFERENTIAL EQUATION OF MIXED TYPE, by Hajimu Ogawa. Technical rept. no. 6 on Contract AF 49(638)398. Mar 59, 24p. 3 refs. AFOSR TN-59-280; AD-212 913.
Order from LC mi$2.70, ph$4.80 PB 142 365

In this paper a boundary value problem for the mixed partial differential equation $K(y)u_{xx} + u_{yy} = f(x, y)$, with $K > 0$ for $y > 0$, $K < 0$ for $y < 0$ and $K(0) = 0$, is approximated by a boundary value problem for a difference equation, which is shown to have a solution under certain conditions on the function K. The solution of the difference equation is then shown to converge to the solution of the differential equation,

provided the latter exists and is sufficiently smooth. The present work is a generalization of the methods used by Filippov in considering the equation with $K(y) = y$. These methods depend essentially on proving that the solution of the difference equation satisfies a maximum principle analogous to the maximum principle for the differential equation. A maximum principle for mixed elliptic-hyperbolic differential equations was first discovered by Gèrmain and Bader for the case $K(y) = y$, and was subsequently extended by Agmon, Nirenberg and Protter to a general function K subject to certain conditions, which are weaker than those found in the present work.

California U., Berkeley.
UNIQUENESS THEOREMS FOR EQUATIONS OF MIXED TYPE III, by M. H. Protter. Technical rept. no. 4 on Contract AF 49(638)398. Mar 59, 17p. 11 refs. AFOSR TN-59-234; AD-212 004.
Order from LC mi$2.40, ph$3.30 PB 142 364

Uniqueness theorems for equations of the form $K(y)u_{xx} + u_{yy} = 0$ are established when it is assumed that u vanishes on a simple arc in the elliptic portion of the domain and on either a characteristic or non-characteristic arc in the hyperbolic region. The restrictions on the domain that were required in the uniqueness proofs of earlier work of various authors have been eliminated.

Carnegie Inst. of Tech., Pittsburgh, Pa.
ON A CLASS OF NONLINEAR INTEGRAL EQUATIONS, by Zeev Nehari. Technical rept. no. 27 on Contract AF 49(638)227. May 59, 16p. 6 refs. AFOSR TN-59-425; AD-214 775.
Order from LC mi$2.40, ph$3.30 PB 142 153

It is shown that the Hammerstein-type nonlinear integral equation

$$y(x) = \int_b^a K(x,t)y(t)F(y^2,t)dt$$

possesses a continuous solution in [a,b] under certain hypotheses.

Chicago U., Ill.
COLLINEATION GROUPS OF NON-DESARGUESIAN PLANES II. SOME SEMI-NUCLEAR DIVISION ALGEBRAS, by D. R. Hughes. Technical note on Research on Algebraic Mechanism of Fiber Spaces, Contract AF 18(600)1383. Mar 59, 14p. 6 refs. AFOSR TN-59-281; AD-212 914.
Order from LC mi$2.40, ph$3.30 PB 142 366

We will consider two classes of non-associative division algebras and the projective planes they coordinatize, with the aim of determining the collineation groups of the planes. This will be the fourth and fifth classes of finite non-Desarguesian planes so analyzed, and we will see that like the twisted fields of Albert, the groups are solvable. This is in sharp contrast to the other two situations, the finite Hall Veblen-Wedderburn planes and the (non-Veblen-Wedderburn) Hughes planes, both of which have non-solvable collineation groups. Since both the Hall and Hughes planes appear more removed from Desarguesian planes than any division ring plane, it is perhaps peculiar that all the known finite non-associative division ring planes have solvable groups. We remark that the semi-nuclear division algebras treated here, together with the twisted fields, exhaust all the finite non-associative division rings known at the present time. Furthermore, our treatment of the collineation group leaves unanswered a number of possibly interesting question: (1) Since we only determine a normal series for the group, is the group itself amenable to direct computation? (2) What is the transitive structure of the group, and more particularly, what are the transitive constituents on the line at infinity of the autotopism group G?

Chicago U., Ill.
FUNCTION SPACES AND DUALITY, by E. H. Spanier. Technical note no. 1 on Research on Duality in Homotopy Theory, Contract AF 49(638)393. Mar 59, 57p. 17 refs. AFOSR TN-59-359; AD-213 669.
Order from LC mi$3.60, ph$9.30 PB 142 148

Chicago U., Ill.
NOTE ON THE PRESERVATION OF CLASSES OF FUNCTIONS, by Antoni Zybmund. Technical note no. 2 on Research on the Hilbert Transform and Related Topics, Contract AF 49(638)451. Apr 59, 14p. 2 refs. AFOSR TN-59-370; AD-213 860.
Order from LC mi$2.40, ph$3.30 PB 140 999

The problem is solved for the necessary and sufficient conditions of a 2-way infinite sequence of numbers to be of type (P, Q), where P and Q are any 2 classes of periodic functions, or, alternately the classes of Fourier series of such functions. A 2-way infinite sequence of numbers is of type (P, Q) if whenever $\Sigma c_n e^{inx}$ is in P, $\Sigma c_n \lambda_n e^{inx}$ is in Q. The class λ_α $(0 \leq \alpha < 1)$ of periodic functions f is considered such that $f(x + h) - f(x) = 0(h^\alpha)$ for $h \to + 0$.

Chicago U., Ill.
ON THE EXISTENCE OF CONJUGATE FUNCTIONS OF HIGHER ORDER, by Mary Weiss and Antoni Zygmund. Technical note no. 1 on Research on the Hilbert Transform and Related Topics, Contract AF 49(638)451. Apr 59, 24p. 5 refs. AFOSR TN-59-371; AD-213 859.
Order from LC mi$2.70, ph$4.80 PB 140 998

Chicago U., Ill.
SEMINUCLEAR EXTENSIONS OF GALOIS FIELDS, by D. R. Hughes and Erwin Kleinfeld. Technical note on Research on Algebraic Mechanism of Fiber Spaces, Contract AF 18(600)1383. Apr 59, 8p. 2 refs. AFOSR-TN-59-497; AD 215 922.
Order from LC mi$1.80, ph$1.80 PB 142 358

Chicago U., Ill.
SINGULAR INTEGRALS, by Vivienne E. Morley. Technical note no. 3 on Research on the Hilbert Transform and Related Topics, Contract AF 49(638)451. Apr 59. 22p. 8 refs. AFOSR TN-59-373; AD-213 857.
Order from LC mi$2.70, ph$4.80 PB 140 997

Duke U. [Durham, N. C.]
ON THE NUMERICAL SOLUTION OF A NON-LINEAR, FIRST-ORDER DIFFERENTIAL EQUATION, by Jim Douglas, Jr. Rept. on Contract AF 18(600)1341. Mar 59, 28p. 15 refs. AFOSR TN-59-403; AD-214 523.
Order from LC mi$2.70, ph$4.80 PB 142 147

Georgia U., Athens.
ESTIMATING THE POISSON PARAMETER FROM TRUNCATED SAMPLES WITH MISSING ZERO OBSERVATIONS, by A. Clifford Cohen, Jr. Technical rept. no. 15 on Contract DA 01-009-ORD-463. 23 July 58, 10p. 7 refs.
Order from LC mi$1.80, ph$1.80 PB 142 337

[Illinois Inst. of Tech., Chicago].
EXPANSION OF ANALTYIC FUNCTIONS BY SERIES OF POWERS OF A POLYNOMIAL, by Gordon Pall. Final technical rept. for Oct 53-May 57 on Contract DA 11-022-ORD-1494. [1957] 7p. 10 refs. AD-142 954.
Order from LC mi$1.80, ph$1.80 PB 142 033

The investigations of the project have led to new expansions and applications arising from the recognition of the Jacobi expansion of a given function. A method of constructing the Jacobi expansion is outlined, and the generalized derivative is formulated. The publications and manuscripts on the following topics associated with the project are listed: generalized derivates and expansions, a symmetric generalization of the Lagrange interpolation formula, on approximate eigenvalues obtained by the method of least squares, Jacobi series and the numerical solution of eigenvalue problems, behavior of a complex function at infinity, multiderivatives and multiintegrals, a simple definition of analytic functions and general multifunctions, generalized Jacobi expansions and corresponding derivatives, an extension of the concept of derivative with applications, and the Jacobi derivative operator.

Institute for Advanced Study, Princeton, N. J.
AFFINE-REGULAR POLYGONS INSCRIBED IN PLANE CONVEX SETS, by B. Grünbaum. Rept. on Contract AF 49(638)253. Feb 59, 7p. 10 refs. AFOSR TN-59-207; AD-211 661.
Order from LC mi$1.80, ph$1.80 PB 142 005

The possibility of inscribing affine-regular polygons in nondegenerate plane convex sets is considered. Any boundary point of such a set is the vertex of an inscribed affine-regular pentagon, and there exist inscribed affine-regular pentagons having one side parallel to any given direction. An affine-regular octagon may be inscribed in any centrally symmetric convex set.

Institute for Advanced Study, Princeton, N. J.
ON INTERSECTIONS OF SIMILAR SETS, by Branko Grünbaum. Rept. on Contract AF 49(638)253. Mar 59, 16p. 15 refs. AFOSR TN-59-391; AD-214 511.
Order from LC mi$2.40, ph$3.30 PB 142 002

Some aspects of the following combinatorial problem are discussed: For a given convex compact set K, what is the minimal number h(K) (resp. H(K)) such that for any family $\{x_\alpha + K\}$ (resp. $\{x_\alpha + \lambda_\alpha K\}$) of mutally intersecting translates of K (resp. sets homothetic to K) there exist h(K) (resp. H(K)) points such that each member of the family contains at least one of them. Main results: (i) For each n, $\sup \{h(K); K \subset E^n\} < \infty$ and $\sup \{H(K); K \subset E^n\} < \infty$. (ii) If K is a centrally symmetric plane convex set, $h(K) \leq 3$ and $H(K) \leq 7$. (iii) For a circular disc C, $h(C) = 3 < H(C)$.

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
HYPERBOLIC AND PARABOLIC EQUATIONS WITH SUBHARMONIS DATA, by A. Weinstein. Rept. on Contract AF 49(638)228. Mar 59, 16p. 17 refs. Technical note BN-164; AFOSR TN-59-426; AD-214 776.
Order from LC mi$2.40, ph$3.30 PB 142 154

Study of monotonicity and convexity properties of a class of hyperbolic and parabolic equations with subharmonic data. Extension of previous results to the case of non-subharmonic data.

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON A SINGULAR DIFFERENTIAL OPERATOR, by Alexander Weinstein. Rept. on Contract AF 49(638)228. June 59, 13p. 16 refs. Technical note BN-175; AFOSR-TN-59-651.
Order from LC mi$2.40, ph$3.30 PB 142 272

This paper gives some applications of a singular differential operator to some problems in differential equations.

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON THE EXISTENCE THEOREM OF CARATHEODORY FOR ORDINARY AND HYPERBOLIC EQUATIONS, by Wolfgang Walter. Rept. on Contract AF 49(638)228. June 59, 41p. 16 refs. Technical note BN-172; AFOSR-TN-59-614; AD-217 401.
Order from LC mi$3.30, ph$7.80 PB 142 246

The existence theorem of Peano for the ordinary differential equation $y' - f(x, y)$ was generalized by Caratheodory to functions $f(x, y)$ with singularities of a certain type. In this paper it is shown that a generalization of the same kind can be performed with the hyperbolic differential equation (*) $u_{xy} = f(x, y, u, u_x, u_y)$. An existence and uniqueness theory for the characteristic and for the non-characteristic initial value problem of the equation (*) in the sense of Caratheodory is given.

Institute of Mathematical Sciences, New York U., N. Y.
A COMPLEX FROBENIUS THEOREM, by Louis Nirenberg. Rept. on Contract N6ori-201(01). Jan 58, 15p. 3 refs. IMM NYU-245.
Order from LC mi$2.40, ph$3.30 PB 139 451

Institute of Mathematical Sciences, New York U., N. Y.
A MATCHING THEOREM FOR LOCALLY STATION-

ARY RANDOM PROCESSES, by R. A. Silverman. Rept. on Contract AF 19(604)3498. Jan 59, 19p. 5 refs. Research rept. no. EM-177; AFCRC TN-58-579; AD-206 577.
Order from LC mi$2.40, ph$3.30 PB 139 439

A theory is developed which shows the smoothing and aperture-limiting operations required to convert an arbitrary integrable non-negative function and an arbitrary continuous correlation function into components of a locally stationary random process. The harmonic analysis of locally stationary processes is examined and found to be free of certain complications that occur in the case of ordinary stationary processes.

Institute of Mathematical Sciences, New York U., N. Y.
ON THE DOUBLE LAPLACE TRANSFORMS OF SOME GREEN'S FUNCTIONS, by James Radlow. Rept. on Contract AF 19(604)1717. Nov 58, 8p. 2 refs. Research rept. no. EM-118; AFCRC-TN-58-580; AD-206 578.
Order from LC mi$1.80, ph$1.80 PB 139 440

A simple method is given for calculating double Laplace transforms of elementary solutions (Green's functions) of linear second order elliptic equations with constant coefficients; a specialization to the case of the two-dimensional reduced wave equation permits the evaluation of the new Bessel function integrals.

Institute of Mathematical Sciences, New York U., N. Y.
VECTOR SPACES AND LINEAR INEQUALITIES, by Eugene Levine and Harold N. Shapiro. Rept. on Contract Nonr-285(32). May 58, 14p. 2 refs. IMM NYU-248.
Order from LC mi$2.40, ph$3.30 PB 139 443

The primary aim of this paper is to provide a simple and coherent development of the principal theorems concerning systems of linear inequalities in terms of the machinery of the theory of linear vector spaces. At its inception this development is based on a simple geometric separation theorem which is easily deduced from the standard theorem concerning the separation of closed convex bodies. This same geometric theorem also yields easily the existence of completely mixed strategies for the essential part of a rectangular game.

Institute of Statistics, North Carolina State Coll., Raleigh.
SOME GENERAL REMARKS ON THE DEFINITION OF THE CONCEPT OF BIASED ESTIMATORS, by H. R. van der Vaart. Technical rept. no. 17 on Experimental Designs for Industrial Research, Contract DA 36-034-ORD-1517. July 57, 18p. 14 refs. AD-143 394.
Order from LC mi$2.40, ph$3.30 PB 142 058

A few alternative approaches to the general concept of bias are explored, and the interrelations between various definitions are given. A real parameter is estimated by a real statistic, distributed continuously. Only negative bias is considered in most cases, the treatment of positive bias being self-evident. Expectation-bias and median-bias are defined, and bias concepts based on comparing estimators are discussed; these include the comparing approach and distribution-bias. A lemma is presented which indicates certain types of bias. Proof is given of some statements regarding estimators and variance, sample medians as estimators of distribution medians, and estimators and correlation coefficients.

Iowa State U. of Science and Tech., Ames.
ON THE ABSOLUTE DIFFERENCE AND ABSOLUTE DEVIATION OF DISCRETE DISTRIBUTIONS, by S. K. Katti. Rept. on Contract AF 49(638)43. [1959] 29p. 7 refs. AFOSR-TN-59-178; AD-211 318.
Order from LC mi$2.70, ph$4.80 PB 142 236

Iowa State U. of Science and Tech., Ames.
SIZE AND POWER OF TESTS USING SOME OPTIMAL WELCH-TYPE STATISTICS, by Roger S. McCullough and John Gurland. Report. on Contract AF 49(638)43. [1959] 32p. 11 refs. AFOSR-TN-59-177; AD-211 317.
Order from LC mi$3.00, ph$6.30 PB 142 235

By using a finite series representation, from Gurland and Rosenberg, of the distribution of a certain class of statistics, and by utilizing other techniques presented here, two types of statistics are developed for testing the hypothesis of the equality of the means of two normal populations, using small sample sizes. One type of statistic, called unilateral, effectively controls the size of the test under variance heterogeneity, if it is known a priori that the variance of one specified population is greater than that of the other. The second type of statistic, called bilateral, controls the size when there is no a priori knowledge of the population variances. Tables are included specifying both types of statistics, and giving size and power.

Louisiana State U. [Baton Rouge].
AFFINE SEMIGROUPS I, by H. Cohen and H. S. Collins. Rept. on Contract AF 18(603)89. 20 Aug 58, 26p. 9 refs. AFOSR TN-58-709; AD-162 243.
Order from LC mi$2.70, ph$4.80 PB 137 432

Michigan U. [Ann Arbor].
APPLICATIONS OF THE THEORY OF MORSE TO SYMMETRIC SPACES, by Raoul Bott and Hans Samelson. Rept. on Contract AF 49(638)104. Mar 59, 66p. 20 refs. AFOSR TN-59-130; AD-210 769.
Order from LC mi$3.90, ph$10.80 PB 142 401

Michigan U. Research Inst., Ann Arbor.
ASYMPTOTIC SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS, by Nicholas D. Kazarinoff. Final rept. on Contract AF 49(638)192. Apr 59, 8p. 2657-4-F; AFOSR TR-59-49; AD-215 714.
Order from LC mi$1.80, ph$1.80 PB 142 190

The project has supported the investigation of three mathematical problems: a Peano-like existence proof

for solutions of the Goursat problem for quasi-linear equations has been found, a Runge-Kutta process for the numerical solution of this problem has been developed, and the asymptotic behavior of solutions of ordinary linear differential equations having two simple

Midwest Research Inst. [Kansas City, Mo.]
EXPANSION OF THE CONFLUENT HYPERGEOMETRIC FUNCTION IN SERIES OF BESSEL FUNCTIONS, by Yudell L. Luke. Rept. on Contract AF 49(638)66. 15 Apr 59, 25p. 18 refs. AFOSR-TN-59-134; AD-210 862.
Order from LC mi$2.70, ph$4.80 PB 142 373

Naval Avionics Facility, Indianapolis, Ind.
TABLES OF ELEMENTARY FUNCTIONS. VOLUME I, by R. L. LaFara. Sep 57, 408p. 4 refs. NAFI-TP-35.
Order from LC mi$11.10, ph$62.10 PB 142 211

Each of the functions, sine, cosine, arctangent, exponential, and logarithm, was computed by its Maclaurin series, with the exception that the arguments were transformed in order to reduce the number of terms necessary and also to avoid round-off error. Ten places of decimals were computed for each term of the series and then rounded to nine places in computing the sum. The series was truncated at the first term that was less than 5×10^{-10}. Any subsequent transformations on the sum of the series was carried out with nine places of decimals and the final answer rounded to eight decimal places except in the case of the exponential function which was rounded to seven decimal places or to eight significant figures.

Naval Avionics Facility, Indianapolis, Ind.
TABLES OF ELEMENTARY FUNCTIONS. VOLUME II, by R. L. LaFara. Sep 57, 168p. 4 refs. NAFI-TP-35.
Order from LC mi$7.80, ph$25.80 PB 142 217

See PB 142 211

Naval Proving Ground, Dahlgren, Va.
COMPUTING PROGRAMS FOR THE COMPLEX EXPONENTIAL INTEGRAL, by A. V. Hershey. 1 June 59, 48p. 8 refs. NPG rept. no. 1646; NAVORD rept. no. 5909.
Order from LC mi$3.30, ph$7.80 PB 142 215

The asymptotic series for the complex exponential integral with remainder is used in subroutines to evaluate the conventional exponential integral and the sine and cosine integrals. A series expansion with improved accuracy of calculation is used to evaluate the remainder. A rational polynomial approximation is developed for the complex exponential integral. The range of validity of the rational approximation is that part of the complex plane on the negative side which is bounded by the imaginary axis and by a circle of unit radius. The exponential integral correct to thirteen significant digits is tabulated at unit intervals in the argument.

North Carolina State Coll., Raleigh.
SUCCESSIVE APPROXIMATION APPLIED TO QUADRATURE FORMULAS, by Raimond A. Struble and Robert Richard Miller. Technical memo. no. 1 on Contract DA 36-034-ORD-2733. May 59, 8p. AD-217 071.
Order from LC mi$1.80, ph$1.80 PB 142 314

North Carolina U. [Chapel Hill].
THE PROBABILITY OF REVERSAL ASSOCIATED WITH A TEST PROCEDURE WHEN DATA ARE INCOMPLETED, by Bernard S. Pasternack and Junjiro Ogawa. Technical rept. no. 8 on Estimation of Parameters by Order Statistics, Contract DA 36-034-ORD-2184. 15 May 59, 19p. 3 refs.
Order from LC mi$2.40, ph$3.30 PB 142 317

Northwestern U. [Evanston, Ill.]
CERTAIN OPERATORS AND FOURIER TRANSFORMS ON L^2, by Richard R. Goldberg. Rept. on Contract AF 49(638)383. Mar 59, 5p. 2 refs. AFOSR TN-58-1007; AD-206 150.
Order from LC mi$1.80, ph$1.80 PB 139 437

Northwestern U. [Evanston, Ill.]
EXISTENCE THEOREMS FOR CERTAIN CLASSES OF TWO-POINT BOUNDARY PROBLEMS BY VARIATIONAL METHODS, by Richard J. Driscoll. Technical rept. no. 2 on Contract AF 49(638)400. Mar 59, 40p. 8 refs. AFOSR TN-59-254; AD-212 254.
Order from LC mi$3.00, ph$6.30 PB 142 297

The principal results of this paper are existence theorems for solutions of two classes of vector differential systems. In each case the existence theorem is established by variational methods.

Northwestern U. [Evanston, Ill.]
GENERALIZED LINEAR DIFFERENTIAL SYSTEMS, by William T. Reid. Technical rept. no. 3 on Contract AF 18(603)86. Sep 58, 31p. 13 refs. AFOSR TN-58-873; AD-203 915.
Order from LC mi$3.00, ph$6.30 PB 142 295

Northwestern U. [Evanston, Ill.]
ON HILBERT TRANSFORMS OF FUNCTIONS OF CLASS L', by Richard R. Goldberg. Rept. on Contract AF 49(638)383. Mar 59, 5p. 2 refs. AFOSR TN-58-610; AD-162 138.
Order from LC mi$1.80, ph$1.80 PB 139 438

Northwestern U. [Evanston, Ill.]
THE ISOPERIMETRIC INEQUALITY AND ASSOCIATED BOUNDARY PROBLEMS, by William T. Reid. Technical rept. no. 1 on Contract AF 49(638)400. Dec 58, 13p. 8 refs. AFOSR TN-59-2; AD-208 182.
Order from LC mi$3.00, ph$6.30 PB 142 294

The extremal property of the smallest proper value of the boundary problem $(\not\Phi)\ \eta'' + \lambda\eta = 0$, $\eta(0) = 0$, $\eta(L) = 0$, is used to present an elementary proof of the isoperimetric inequality $4\pi A \leq L^2$ for a simple closed plane curve of length L and enclosed area A. With the aid of this extremal property there is established also

an integral inequality for simple connected rectifiable pieces of regular surfaces, which in turn provides an elementary proof of the result of Carleman [Mathematische Zeitschrift 9 (1921), 154-160] that the isoperimetric inequality persists for such pieces of minimal surfaces. The extremal property of the smallest proper value of a boundary problem related to (*) is shown to afford a similar proof of the modified isoperimetric inequality for the simplest instance of a plane variational problem of "Dido type."

Purdue Research Foundation, Lafayette, Ind.
ON DIFFERENCES OF UNITARILY EQUIVALENT SELF ADJOINT OPERATORS, by C. R. Putnam. Technical note no. 9 on Commutators on Hilbert Space, Contract AF 18(603)139. May 59, 10p. 7 refs. PRF 1421; AFOSR-TN-59-413; AD-214 530.
Order from LC mi$1.80, ph$1.80 PB 142 265

Suppose that A and B are bounded self-adjoint operators satisfying $H = A - B \geq 0$. In case B is unitarily equivalent to A, that is if $B = U^*AU$ and if $H \geq 0$, $\neq 0$, then the spectral resolution of U must have an absolutely continuous component. In particular, the spectrum of U has a positive measure. If $H = DD^* - D^*D$ and if D is non-singular with a polar factorization $D = PU$ ($P \geq 0$, U unitary) then U must have a spectrum with a positive measure. It is shown that P must have at least two points in its cluster spectrum.

Purdue U., Lafayette, Ind.
EXTENSION PROBLEM FOR QUASI ADDITIVE SET FUNCTIONS AND RADON-NIKODYM DERIVATIVES, by Lamberto Cesari. Technical note no. 17 on Analytical Theory of Continuous Transformations, Contract AF 18(600)1484. Apr 59, 46p. 10 refs. AFOSR TN-59-477; AD-215 720.
Order from LC mi$3.30, ph$7.80 PB 142 230

Purdue U., Lafayette, Ind.
QUASI ADDITIVE SET FUNCTIONS AND THE CONCEPT OF INTEGRAL OVER A VARIETY, by Lamberto Cesari. Technical note no. 16 on Analytical Theory of Continuous Transformations, Contract AF 18(600)1484. Apr 59, 33p. 9 refs. AFOSR TN-59-478; AD-215 731.
Order from LC mi$3.00, ph$6.30 PB 142 231

Rome Air Development Center, Griffiss AFB, N. Y.
STOCHASTIC PROCESSES: AN EXPOSITORY REPORT BASED ON LECTURES, by F. M. Reza. Apr 59, 53p. 15 refs. RADC-TN-59-56; AD-210 725.
Order from LC mi$3.60, ph$9.30 PB 142 368

A report to provide the practicing engineer with some of the mathematical tools of analysis of stochastic processes.

Stanford U., Calif.
A CONTRIBUTION TO THE THEORY OF BULK QUEUES, by Rupert G. Miller, Jr. Technical rept. no. 4 on Contract Nonr-225(28). 1 Apr 58, 56p. 11 refs.
Order from LC mi$3.60, ph$9.30 PB 139 461

The first treatment of a group queue occurred in 1954 and 1955 in the work of N. T. J. Bailey and F. Downton. In the model of Bailey and Downton the customers still arrived singly but were serviced in groups of s. Bailey derived the stationary distribution of the number of customers in the queue, and Downton obtained the Laplace transform of the waiting time distribution in equilibrium. In this paper an attempt is made to treat the general problem in which the customers arrive in groups and are serviced in groups. Since both Bailey and Downton referred to their group service as bulk service, this general model will be given the title of "bulk queue." In § 2 equilibrium conditions for a general bulk queue are established in terms of first moments. § 3 considers the special bulk queue in which the arrival times are exponentially distributed. In § 4 the service distribution is assumed to be exponential, and the stationary distribution of the imbedded Markov chain is characterized. The waiting time distribution in equilibrium is also obtained.

Stanford U., Calif.
LINEAR PROGRAMMING TECHNIQUES FOR REGRESSION ANALYSIS, by Harvey M. Wagner. Technical rept. no. 51 on Contract N6onr-25133. 5 May 58, 11p. 9 refs.
Order from LC mi$2.40, ph$3.30 PB 139 453

Stanford U., Calif.
ON LOCALLY MOST POWERFUL RANK TESTS FOR TWO-SAMPLE PROBLEMS, by Hirofumi Uzawa. Technical rept. no. 7 on Contract Nonr-225(28). 29 Sep 58, 27p. 4 refs.
Order from LC mi$2.70, ph$4.80 PB 142 269

In the present note we are interested in characterizing the class of all locally most powerful rank tests for various two-sample problems. A two-sample problem is concerned with testing the null hypothesis that two samples have the same distributions against an alternative hypothesis. Let $X_1, \ldots, X_{n_1}$ be samples from the first population, $X_{n_1}, \ldots, X_n$ ($n = n_1 + n_2$) from the second population, and the statistic $Z_i = 0$ or 1, according to whether the i-th smallest observation is from the first population or the second.

Stanford U., Calif.
PRIORITY QUEUES, by Rupert G. Miller, Jr. Technical rept. no. 6 on Contract Nonr-225(28). 10 Sep 58, 59p. 21 refs.
Order from LC mi$3.60, ph$9.30 PB 142 083

The "preemptive resume" policy allows the preempted item to resume service at the point at which it was preempted so that its service time upon reentry has been reduced by the amount of time the item has already spent in service. The "preemptive repeat" policy requires the preempted item to commence service again at the beginning. A priority queue with an indifferent server is of course a special case of the preemptive resume discipline.

Virginia Agricultural Experiment Station, Blacksburg.
A COMPARISON OF THE SYSTEMATIC AND RANDOM ALLOCATION OF TREATMENTS IN THE PRESENCE OF KNOWN CONCOMITANT VARIABLES, by Ruth Jean Laity and John E. Freund. Technical rept. no. 30 on Research in Statistical Problems: Multiple Regression Measures of Variation, Mixed Distributions, Reliability, Designs, Contract DA 36-039-ORD-1527. May 57, 19p. 9 refs. AD-142 745.
Order from LC mi$2.40, ph$3.30 PB 142 053

An experiment is performed on t treatments in the presence of a known concomitant variable, e.g., a trend. The model equations for all observations are given in matrix notation as $Y = XB + E$. A numerical example is given to compare systematic and random allocation. When a concomitant variable is present in an experiment and it is known a priori, it is possible to maximize, by a systematic design, the precision of the experiment as measured by the trace of the variance-covariance matrix of the estimates of the β's (treatment constants) or by the average variance of the paired differences between the β's. There is a gain in the precision in the numerical example, but the results are not conclusive.

Virginia Agricultural Experiment Station, Blacksburg.
RANDOMIZED ESTIMATES IN POWER SPECTRAL ANALYSIS, by Willard O. Ash and John E. Freund. Technical rept. no. 31 on Research in Statistical Problems: Multiple Regression Measures of Variation, Mixed Distributions, Reliability, Designs, on Contract DA 36-034-ORD-1527. Aug 57, 107p. 28 refs. AD-140 411.
Order from LC mi$5.70, ph$16.80 PB 142 040

Contents:
Stochastic processes and their properties
Statistical analysis of stationary Gaussian processes
Estimation of the power spectrum
Randomized estimated of power spectra
Applications of power spectral analysis

Washington State Coll. [Pullman].
GENERATORS OF THE UNIMODULAR GROUP, by J. L. Brenner. Technical rept. no. 7 on Bounds for Determinants, Location of Characteristic Roots, Solution of Linear Equations, Contract DA 04-200-ORD-340. [1958] 7p.
Order from LC mi$1.80, ph$1.80 PB 137 425

Washington U. [Seattle].
CONVEX SETS, by V. L. Klee. Final technical rept. for 1 Oct 53-31 Sep 57 on Contract DA 04-200-ORD-292. 29 refs. AD-146 051.
Order from LC mi$1.80, ph$1.80 PB 142 037

This Final Technical Report surveys the work accomplished under the contract and lists the publications resulting therefrom. Since most of the material was fully described in the various Interim Technical Reports and has also been published in various scientific journals, it was not felt necessary to burden this report with a large collection of details.

Washington U., Seattle.
ESTIMATION OF CRITERION PARAMETERS FROM A BIASED SAMPLE, by William M. Meredith. Rept. on Contract Nonr-477(08) and Public Health Research Grant M-743(C3). Apr 58, 114p. 16 refs.
Order from LC mi$6.00, ph$18.30 PB 139 383

The psychologist interested in the use of mental tests and other variables to predict achievement in academic course areas, occupations, military specialties, etc., invariably finds he must use biased or selected samples of observations. As it is often impractical to get unbiased samples in certain types of psychological research, it is a basic problem to determine estimators of population parameters that are based on biased sample statistics. A number of types of sample bias are common in psychological research, but this thesis will be restricted to the particular type.

Washington U., Seattle.
STUDY ON EXTERIOR DIFFERENTIAL SYSTEMS, by Jun-ichi Hano and Edward T. Kobayashi. Technical rept. no. [7] on Contract Nonr-477(15). 1 Sep 58, 65p. 5 refs.
Order from LC mi$3.90, ph$10.80 PB 142 093

Notes on a seminar on the Cartan-Kaehler theorem and the Kuranshi theory of prolongation of exterior differential systems.

Wisconsin U. [Madison].
HIGH PRECISION CALCULATION OF ARCSIN X, ARCCOS X, AND ARCTAN X, by I. E. Perlin. Rept. on Contract AF 29(600)1756. June 59, 24p. 4 refs. AFMDC-TR-59-21; AD-215 467.
Order from LC mi$2.70, ph$4.80 PB 142 188

A high precision method is developed for calculating Arcsin x, Arccos x, and Arctan x. A complete error analysis is made for electronic computers using floating point arithmetic.

Wayne State U., Detroit, Mich.
ISOTOPY INVARIANTS OF TOPOLOGICAL SPACES, by Sze-Tsen Hu. Technical note no. 5 on Contract AF 49(638)179. Mar 59, 73p. 9 refs. AFOSR TN-59-236; AD-212 006.
Order from LC mi$4.50, ph$12.30 PB 142 025

The purpose of this technical note is to introduce and study new algebraic isotopy invariants of spaces. A general method of constructing isotopy invariants is given by means of a certain class of functors. Special isotopy functors are constructed in this technical note, namely, the m-th residual functor R_m and the m-th enveloping functor E_m. The homology groups obtained by using these special functors are proved to be finitely computable. Applications of these isotopy invariants to linear graphs are given in the last two sections of this technical note.

Wayne State U., Detroit, Mich.
ON THE UNIQUENESS THEOREM OF LOCAL HOMOLOGY THEORY, by Sze-Tsen Hu. Technical

note no. 4 on Contract AF 49(638)179. Mar 59, 16p. 15 refs. AFOSR-TN-59-204; AD-211 609.
Order from LC mi$2.40, ph$3.30 PB 142 237

Local homology groups were first introduced by E. R. van Kampen thirty years ago. Since then, numerous variants and generalizations of van Kampen's definition have been given by various authors. In a recent paper of T. R. Brahana, an axiomatic approach to the local homology theory is given and the uniqueness theorem is established for the category of triangulable local pairs. His methods of proof are parallel to those used by Eilenberg and Steenrod in the global homology theory. If one applies the global uniqueness theorem of Eilenberg and Steenrod instead of paraphrasing their methods, the proof of the local uniqueness theorem would be much simpler. In the present technical note, such a proof is produced.

Wayne State U., Detroit, Mich.
RELATION BETWEEN ABSTRACT HOMOTOPY AND GEOMETRIC HOMOTOPY, by Sadanand Verma. Technical note no. 3 on Contract AF 49(638)179. Mar 59, 121p. 12 refs. AFOSR-TN-59-126; AD-210 614.
Order from LC mi$6.30, ph$19.80 PB 142 239

Recent work of D. M. Kan has shown that most theorems of homotopy theory can be obtained by translating into topological language, the theorems on abstract complexes. Such an abstract theory, for all abstract cubical complexes satisfying extension axiom, is sketched in [3] and in [5] it is suggested that abstract homotopy notion may be developed for all c. s. s complexes satisfying simplicial version of the extension axioms -- known as Kan complexes throughout this dissertation. The purpose of this dissertation is to describe an actual construction of such an abstract homotopy theory for the category of Kan complexes and Kan maps, to give an axiomatization of such a theory and to establish the uniqueness of The Abstract Homotopy Theory.

Yale U., New Haven, Conn.
REPRESENTATION OF CERTAIN ALGEBRAS ON HILBERT SPACE, by Robert Barr Smith. Technical rept. no. 2, 1 Oct 55-31 July 56, on General Theory of Branch Algebras, Contract DA 19-059-ORD-2300. [1956] 61p. 8 refs. AD-135 464.
Order from LC mi$3.90, ph$10.80 PB 142 057

Two problems are studied which deal with representations of algebras as algebras of operators on Hilbert spaces. The first is investigated to determine when a representation of an algebra with involution is similar to a *-representation. The second is studied to determine when a representation of a subalgebra can be extended to the whole algebra. These questions are formulated as questions of existence of an appropriate new inner product on the Hilbert space of representation. The first problem is studied by finding the necessary and sufficient local conditions for a representation of an algebra with involution similar to a *-representation and proving the theorem which states that any representation of a commutative C*-algebra is similar to a *-preserving one. The second problem is solved by imposing the condition that the Hilbert space associated with an extension is that of the original representation. For a representation A of a suitable subalgebra of a commutative C*-algebra, the existence of an operator on the Hilbert space of A bearing a certain relation to A, together with a certain commutativity condition, is shown necessary and sufficient for A to be extendable. Proof is given that specific properties of such subalgebras and their representations insure the existence of such an operator and that the whole commutative C*-algebra and its representations possess these properties. The restriction is removed, and the necessary and sufficient conditions are found for a representation of a suitable subalgebra of a commutative C*-algebra to have an extension whose associated Hilbert space may contain that of the original representation as a proper subspace.

Computing Devices

[George Washington U., Washington, D. C.]
ALGEBRAIC METHOD FOR SIMPLIFICATION OF BOOLEAN FUNCTIONS, by N. T. Grisamore, L. S. Rotolo and others. Technical rept. on Contracts N7onr-419(06) and Nonr-2660(00). 2 Sep 58. 14p.
Order from LC mi$2.40, ph$3.30 PB 140 989

A number of different methods have been proposed and used to find minimal forms of Boolean functions. All of these have resorted to some sort of chart or geometrical representation for the process of reducing the complex functions to simpler forms. These methods are satisfactory if one is dealing with a function having only a few variables, but for functions having many variables it would be desirable to have an algebraic process of reduction which could be computer programmed. The method described in this paper, as well as most other methods, resorts to operating on the position numbers of units in the truth value of the function to be reduced.

Institute for Advanced Study, Princeton, N. J.
ELECTRONIC COMPUTER PROJECT, by Hans J. Maehly. Final rept. for 15 June 56-30 June 57 on Contract Nonr-1358(04). 31 Aug 57, 11p. 6 refs.
Order from LC mi$2.40, ph$3.30 PB 137 460

Work performed during this period covered: (1) flint (floating-point interpretive subroutine); (2) sassy- a symbolic assembly program; (3) magnetohydrodynamic theory of solar spicules; (4) numerical experimentation on stellar evolution; (5) internal equilibrium of dense cold stars; (6) the origin of high velocity stars; (7) numerical calculations of the angular distributions for deuteron - proton and similar reactions; (8) molecular integrals; (9) elastic scattering of 17 Mev protons by nuclei; (10) proton orbits in a 3 Bev synchrotron; (11) automatic adjustment of parameters for rational approximations; (12) historical ephemeris for the years -600 to 0; (13) student use of the machine January-June 1957; (14) ion exchange in ternary systems.

Brown U. Div. of Engineering, Providence, R. I.
STATIC AND DYNAMIC TESTS ON BEHAVIOR OF METAL PARTS IN THE PLASTIC RANGE, by Daniel C. Drucker. Final technical rept. on Contract DA 19-020-ORD-3172. 31 Oct 57, 6p. 11 refs.
Order from LC mi$1.80, ph$1.80 PB 140 947

Abstracts of previous papers in this series on the deflection of plates and beams.

Illinois Inst. of Tech., Chicago.
LINEARIZATION OF PLASTICITY PROBLEMS BY MEANS OF NONHOMOGENEOUS MATERIALS, by Philip G. Hodge, Jr. Rept. on Contract Nonr-1406(04). May 58, 17p. 8 refs. DOMIIT rept. no. 1-3.
Order from LC mi$2.40, ph$3.30 PB 139 635

A homogeneous section of a structure can be replaced by a nonhomogeneous section so that the overall properties of the structure are unchanged. Even if the yield condition for the homogeneous structure is nonlinear, it is often possible to choose the nonhomogeneous structure so that the yield condition is piecewise linear. The techniques are illustrated by application to beam and shell problems.

[Institute for Fluid Dynamics and Applied Mathematics] U. of Maryland, College Park.
SHOCK WAVE PROPAGATION IN AN INFINITELY ELECTRICALLY CONDUCTIVE GAS WITH TRANSVERSE MAGNETIC FIELD AND GRAVITATION, by S. I. Pai. Rept. on Contract AF 18(600)993. Sep 57, 30p. 4 refs. Technical note BN-109; AFOSR-TN-57-578; AD-136 566.
Order from LC mi$2.70, ph$4.80 PB 137 370

The behavior of a one dimensional strong shock wave propagating itself in an infinitely electrically conductive gas in the presence of a transverse magnetic field and of gravity has been analyzed by means of the Lagrangian method. The effect of the magnetic field is to increase the speed of the shock wave and the domain influenced by the shock wave. A brief description of the characteristics of the same problem from the Eulerian point of view is also given.

Martin Co., Baltimore, Md.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE STRESSES AND STRAINS AROUND CUTOUTS IN LOADED, UNEVENLY HEATED PLATES, by P. C. Huang and C. J. Van Der Maas. Rept. for 1 Apr 58-15 Jan 59 on Structures Research at Elevated Temperature, Contract AF 33(616)3617. Mar 59, 173p 4 refs. WADC Technical rept. 59-2; AD-212 565.
Order from OTS $3.00 PB 151 867

This report presents a method for calculating the stresses and strains in unevenly heated flat plates with discontinuities. The analysis method is limited to elastic loads in the plane of the plate and to temperature and strain distributions which are two-dimensional. Several experiments using 2024-T4 bare aluminum plates with square cutouts are reported in detail. It is concluded that the analytical method has been verified by the experimental data.

Minnesota U., Minneapolis.
THE RANDOM VIBRATION OF ELASTIC STRINGS: THEORETICAL, by Richard H. Lyon. Rept. for July-Sep 58 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5426. May 59, 26p. 17 refs. WADC Technical rept. 58-570; AD-214 383.
Order from OTS $0.75 PB 151 885

The response of a perfectly flexible string with longitudinal deformation to random excitation is studied in some detail. The equations of motion are essentially those of Carrier (Quart. App. Math. 3, 157-165). The modified mean square response for the "elastic" strings is discussed and it is shown that the mean square deflection is diminished from the linear case. From a study of the fourth moments, it also appears that the shape of probability distributions of the transverse displacement are altered, the response to gaussian noise being in general non-gaussian.

Minnesota U., Minneapolis.
RECENT DEVELOPMENTS IN INELASTICITY, by L. Albert Scipio, II and Chi-Sing Chang. Rept. for 11 Apr-30 Nov 58 on Mechanics of Flight, Contract AF 33(616)5723. Nov 58, 59p. 244 refs. WADC Technical note 58-342; AD-206 261.
Order from OTS $1.50 PB 151 823

The objective of this paper is to review the recent developments in inelasticity with particular emphasis on viscoelasticity and thermoviscoelasticity. In particular, the fundamental principles of viscoelasticity and the application of the theory are discussed. The principal contributions to the general theory of inelasticity since 1952 are discussed. Special note is made of specific areas of vital research in this area.

Massachusetts Inst. of Tech., Cambridge.
BRITTLE FAILURE IN CARBON PLATE STEEL STRUCTURES OTHER THAN SHIPS, A CRITICAL SURVEY, by M. E. Shank. Rept. on Contract NObs-50148. 1 Dec 53, 49p. 138 refs. Ship Structure Committee serial no. SSC-65.
Order from LC mi$3.30, ph$7.80 PB 142 127

This survey was undertaken in order to supplement the study of ship failures. A total of 64 structural failures, plus failures in gas transmission lines, was studied. It is demonstrated that brittle failure results from a combination of many factors. Careful design, selection of materials, and good workmanship are of the greatest importance in the prevention of brittle failure in nonship structures. This is also true of ships.

New York U. Coll. of Engineering, N. Y.
FINAL REPORT OF PROJECT SCAMP, by Jacob B. Gilstein. Rept. for Sep 55-Oct 56 on Contract [Nonr-285(23)]. [1956] 236p. 20 refs.
Order from LC mi$10.20, ph$36.30 PB 137 376

An experimental investigation of the interaction of an explosively created gas bubble in a fluid with structures "floating" on the surface has been made. A theory of the coupled oscillations of a non-migrating, small amplitude pulsating, spherical bubble, in an inviscid, incompressible liquid with a simple structure floating on the surface has been developed and the theoretical results are compared with the empirical data.

Purdue U. School of Aeronautical Engineering, Lafayette, Ind.
UNSTEADY COUETTE FLOW, by Leslie A. Hromas. Doctoral thesis. Rept. on Contract DA 33-008-ORD-888. June 57, 47p. 9 refs. Rept. no. A-57-3; AD-133 991.
Order from LC mi$3.30, ph$7.80 PB 142 338

Experiments were made to demonstrate that transverse velocities can be generated by a pure longitudinal shearing motion. Because of the similarity of behavior and simplicity of geometry, unsteady compressible Couette flow was considered instead of the compressible Rayleigh case. Circular cylinders were used to simulate the unsteady Couette flow. Because of the shear flow in the Couette problem, an additional coupling between the transverse and longitudinal velocities was introduced in the linearized equations to study the problem independently of viscous dissipation and on the basis of a low speed flow. The order of magnitude for the transverse velocity was obtained by introducing a suitable boundary layer displacement thickness based on the exact unsteady incompressible solution. The transverse velocity terms in the linearized momentum equation were found to be of the same order of magnitude as those for the longitudinal velocity. The experimental values for the direct measurement of the velocity profile agreed with the theoretical analysis. Since the velocity was small, a temperature gradient was placed across the annulus to magnify any effects. Periodic fluctuations in the temperature were determined to be equivalent to a transverse velocity of the order of 0.003 fps. These values agreed with the analytical calculations. The magnitude of the transverse velocity was proportional to the imposed temperature gradient; a nonzero value existed for no gradient. After an analysis of possible free convection and centrifugal effects, it was concluded that the data obtained were restricted to regions of the annulus free from the convection currents, and that the centrifugal effects accounted for 10 to 15% of the measured effect.

Rensselaer Polytechnic Inst., Troy, N. Y.
PROBLEMS IN THE DYNAMICS OF ELASTIC SYSTEMS UNDER INITIAL STRESS, by Yih-O Tu and George Handelman. Rept. on Contract AF 18(600)1586. 8 May 59, 80p. 24 refs. RPI MathRep no. 25; AFOSR-TN-59-406; AD-214 503.
Order from LC mi$4.50, ph$12.30 PB 142 229

The eigenvalue problems associated with vibration and stability of beams under initial axial stress and flat plates under initial plane stress are formulated from variational principles for general structural members. These eigenvalue problems can be studied by means of variational principles or through the solution of appropriate differential equations with corresponding boundary conditions.

Watertown Arsenal Labs., Mass.
ELASTIC STRESSES IN A SANDWICH-TYPE BULKHEAD, by J. F. Mescall. Rept. on Stress Analysis Studies for the Jupiter Project. Sep 58, revised Nov 58, 46p. 5 refs. WAL TR 893.3/2.
Order from LC mi$3.30, ph$7.80 PB 139 446

The theory of small deformation of sandwich-type shells has been applied to a spherical sandwich segment and a toroidal sandwich segment. Solutions for the resulting systems of equations have been obtained separately, and suitably joined by imposing conditions of continuity. As an illustrative example, numerical results for the surface stress distribution have been obtained for a representative set of data.

Aerodynamics and Pneumatics

Arnold Engineering Development Center [Tullahoma, Tenn.]
FULL-SCALE PROPULSION TESTING IN WIND TUNNELS, by R. W. Hensel and H. K. Matt. Rept. on ARO, Inc., Contract AF 40(600)700 S/A 13(59-1). May 59, 80p. 40 refs. AEDC-TR-59-9; AD-214 888.
Order from LC mi$4.50, ph$12.30 PB 142 193

The use of wind tunnels in the testing of propulsion installations is described. Only major facilities capable of handling full-scale engines are considered. A historical review of the development of full-scale propulsion testing in wind tunnels is presented, covering the range from early low subsonic speeds at close to sea level conditions to high supersonic speeds at altitudes of over 100,000 ft. The main emphasis is on the higher velocity, continuous flow wind tunnels from transonic upward. Specifically, this includes the French transonic tunnel at Modane, the NASA 8 x 6 ft and 10 x 10 ft propulsion wind tunnels at Cleveland, Ohio, and the U. S. Air Force Propulsion Wind Tunnel at the Arnold Engineering Development Center, Tullahoma, Tennessee. The various techniques for establishing matched altitude conditions of Mach number, pressure, and temperature are discussed.

Arnold Engineering Development Center [Tullahoma, Tenn.]
STARTING LOADS IN AN INTERMITTENT SUPERSONIC WIND TUNNEL, by S. L. Kinsolving and R. Jackson. Rept. on ARO, Inc. Contract AF 40(600)700 S/A 13(59-1). Jan 59, 19p. 3 refs. AEDC TN-59-6; AD-208 691.
Order from LC mi$2.40, ph$3.30 PB 139 467

Starting loads on an AGARD B Model were measured in a 12 inch, variable-density, intermittent wind tunnel at Mach numbers of 2.0, 3.0, and 4.5. The maximum loads varied consistently with starting air density but did not vary systematically with support stiffness or with model attitude in pitch, roll, or yaw; nor was any significant difference found between maximum loads during starting or stopping the tunnel. Two analytical methods are shown to approximate satisfactorily the maximum measured starting loads.

Arnold Engineering Development Center [Tullahoma, Tenn.]
STRUCTURAL DAMPING IN DYNAMIC STABILITY TESTING, by C. J. Welsh and L. K. Ward. Rept. on ARO, Inc. Contract AF 40(600)700 S/A 13(59-1). Feb 59, 15p. 4 refs. AEDC TR-59-5; AD-208 776.
Order from LC mi$2.40, ph$3.30 PB 139 469

The results of a short study of structural-damping characteristics of cross-flexure pivots typical of those used in wind tunnel, dynamic-stability tests are presented. Although it has been usually assumed that the coefficient of the structural-damping term attributed to a cross-flexure pivot is constant, the experimental data here presented indicates that it varies approximately inversely with the frequency. It is shown that the structural-damped motion can be approximated adequately with the viscous-damping equation.

Arnold Engineering Development Center [Tullahoma, Tenn.]
TRANSITION MEASUREMENTS AND THE CORRELATION OF TRANSITION SENSITIVE DATA, by J. Leith Potter, Jack D. Whitfield, and William T. Strike. Rept. on ARO, Inc. Contract AF 40(600)700 S/A 13(59-1). Feb 59, 55p. 19 refs. AEDC TR-59-4; AD-208 775.
Order from LC mi$3.60, ph$9.30 PB 139 468

It is shown that difficulties in the analysis of transition sensitive data often may be surmounted by reference to the actual, mean location of boundary layer transition rather than some Reynolds number based on a fixed length. Particular examples discussed in the report are base pressure and skin friction data. A very satisfactory correlation of base pressure data is achieved for the case of transition in the separated wake of a body.

AVCO Research Lab. [Everett, Mass.]
A FURTHER NOTE ON HYPERSONIC STAGNATION POINT FLOW WITH A MAGNETIC FIELD, by Nelson H. Kemp. Rept. on Contract AF 49(638)61. Apr 59, 17p. 8 refs. Research rept. 53 (supersedes Research rept. 19); AFOSR TN-59-445; AD-214 807.
Order from LC mi$2.40, ph$3.30 PB 142 152

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A MULTIPLE MERCURY MANOMETER READ BY THE CAPACITIVE METHOD, by Herbert J. Bomelburg. Apr 59, 31p. 2 refs. Memo. rept. no. 1205.
Order from LC mi$3.00, ph$6.30 PB 142 304

A method is described for reading a multiple mercury manometer board automatically within a short time (order of 1 second) and for recording the readings in digital form. The essential parts of the readout system are the mercury manometer tubes which form electric capacitors in tank circuits of vacuum tube oscillators. The frequencies of these oscillators are a direct measure of the pressure connected to the manometer tube. The working of this scheme has been tested experimentally and is described in detail. The main interest was to determine the error limits within which the whole system could operate. These limits are around .2% or .1 mm mercury.

Ballistic Research Labs.; Aberdeen Proving Ground, Md.
NUMERICAL DETERMINATION OF STREAMLINES FROM DENSITY DATA, by R. Sedney, N. Gerber and J. M. Bartos. Apr 59, 39p. 12 refs. Rept. no. 1073.
Order from LC mi$3.00, ph$6.30 PB 142 143

For axisymmetric steady flows, isentropic along streamlines, with density field known from interferometric measurements it is shown that the determination of the streamlines, and thereby all other flow variables reduces to the mathematical problem of solving a first order partial differential equation in two independent variables. Following a brief discussion of numerical methods of solution to this problem, a convenient numerical procedure applicable to flow fields about supersonic missiles is presented in detail. A detailed error study is made, partly analytical and partly empirical; conclusions drawn from the analytical study show qualitative agreement with the results of test calculations.

Brown U. Div. of Applied Mathematics, Providence, R. I.
SUPERSONIC PANEL FLUTTER OF A CYLINDRICAL SHELL OF FINITE LENGTH, by Sainsbury L. Strack and Maurice Holt. Rept. on Contract AF 49(638)232. May 59, 62p. 20 refs. AFOSR TN-59-547; AD-216 693.
Order from LC mi$3.90, ph$10.80 PB 142 404

Panel flutter characteristics of cylindrical shells of finite length in a uniform supersonic stream are determined. In previous work on this problem, notably by Miles, Stepanov and by Leonard and Hedgepeth. The aerodynamic term is calculated for a shell of infinite length and the equation of shell motion then reduces to a linear differential equation. In the present paper the aerodynamic term is found for a finite cylinder and the corresponding shell equation is an integro differential equation of 4th or 8th order.

Brown U. Div. of Engineering, Providence, R. I.
THE CONSTANT-CURRENT HOT-WIRE ANEMOMETER IN SUBSONIC COMPRESSIBLE FLOWS, by D. I. Paddison. Rept. on Contract AF 18(600)664. Aug 58, 46p. 8 refs. Technical rept. WT-29; AFOSR TN-58-713; AD-162 248.
Order from LC mi$3.30, ph$7.80 PB 142 119

Measurements have been made of the heat-loss from heated tungsten wires of 0.00015 inch and 0.00035 inch diameter over a range of Mach numbers from 0 to 1.05 and Reynolds numbers from 1 to 36. The sensitivities of a constant-current hot-wire anemometer to fluctuations in subsonic flows are presented and some aspects of the use of the instrument are discussed.

Brown U. Div. of Engineering, Providence.
ON TRANSONIC FLOW ABOUT SLENDER THREE-DIMENSIONAL BODIES, by H. U. Thommen. Rept. on Contract AF 18(600)664. Sep 58, 146p. 14 refs. Technical rept. WT-27; AFOSR TN-58-714; AD-162 249.
Order from LC mi$7.20, ph$22.80 PB 142 189

The nonlinear differential equation for the perturbation potential of transonic flow about slender three-

dimensional bodies is transformed into a nonlinear integral equation by means of multiple Fourier transforms. Two parameters are introduced and an attempt is made to choose these parameters locally, such that the nonlinear integral equation can be approximated by a linear one. Two different methods of choosing the parameters are investigated, varying either one or both parameters. The approximate linear integral equation is of the type of conventional linear perturbation theory, but the kernel function is different. It contains however, the kernel functions of linear subsonic and supersonic theory as special cases, i. e. for special values of the parameters.

Brown U. Div. of Engineering, Providence, R. I.
SERIES SOLUTION TO THE LAMINAR HEAT TRANSFER PROBLEM AT HYPERSONIC SPEEDS, by Hung-Ta Ho and Ronald F. Probstein. Rept. on Research on Thermal and Aerodynamic Characteristics at Hypersonic Speeds, Contract AF 33(616)5442. Sep 58, 43p. 12 refs. WADC TN-58-263; AD-202 333.
Order from LC mi$3. 30, ph$7. 80 PB 142 073

A series-expansion technique is considered for solving the partial differential equations of compressible laminar boundary layer flow. The idea of the method is that all flow quantities are expanded in a power series in an x-dependent variable, where x is distance along the body surface measured from the stagnation point, with the coefficients obtained from the solution of ordinary differential equations. The expansion variable depends on the external flow quantities and is defined through the Stewartson-Illingworth transformation which reduces the boundary layer equations to their low speed form. The method follows a scheme in its original form due to Blasius and involves the underlying assumption that the external velocity distribution can be expressed in a power series in the Stewartson-Illingworth (or other appropriate) x-dependent variable.

Brown U. Div. of Engineering, Providence, R. I.
TRANSONIC FLOWS THROUGH A STRAIGHT CASCADE OF SLENDER AIRFOILS, by A. D. Wood. Rept. on Contracts Nonr-562(09) and AF 18(600)664. Aug 58, 173p. 23 refs. Nonr-562(09)/2; Technical rept. WT-28; AFOSR TN-58-732; AD-162 267.
Order from LC mi$8. 10, ph$27. 30 PB 142 095

The steady, transonic flow of an isentropic, isoenergetic fluid through an arbitrary two-dimensional cascade of slender airfoils is investigated. By application of a double exponential Fourier transform the non-linear partial differential equation for the perturbation potential is transformed to a non-linear integral equation which may, if desired, be solved by an iterative procedure. Two methods are investigated with the object of finding a relatively simple first approximation to the solution in which the non-linear effects are included. The general transonic result so obtained contains the customary linear subsonic and supersonic solutions as special cases.

David Taylor Model Basin, Washington, D. C.
THE CALCULATION OF GOLDSTEIN FACTORS FOR THREE, FOUR AND SIX BLADED PROPELLERS, by A. J. Tachmindji and A. B. Milam. Mar 56, 26p. 8 refs. Rept. no. 1034.
Order from LC mi$2. 70, ph$4. 80 PB 142 250

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
EXPERIMENTAL INVESTIGATION OF THE EFFECT OF EJECTING A COOLANT GAS AT THE NOSE OF A BLUNT BODY, by C. Hugh E. Warren. Rept. on Hypersonic Research Project, Contract DA 04-495-ORD-19. 15 Dec 58, 131p. 9 refs. Memo. no. 47.
Order from LC mi$6. 90, ph$21. 30 PB 142 172

An experimental investigation has been made of the effect of ejecting nitrogen and helium coolant gases at the nose of a blunt body in the GALCIT 5 inch x 5 inch hypersonic wind tunnel at a nominal Mach number of 5. 8. The gases were ejected with "swirl", to encourage them to flow tangentially to the model surface at ejection, and also straight out. Measurements were made of pressure, temperature and heat flux on the surface of the model at incidences of 0, 4, 8 degrees, and for a range of coolant gas flows. A technique is proposed for making steady-state heat-flux measurements by measuring the temperature difference across a uniformly thin skin of uniform, low thermal conductivity.

Guggenheim Aeronautical Lab., Calif. Inst. of Tech. Pasadena.
HYPERSONIC FLOW OVER AN ELLIPTIC CONE: THEORY AND EXPERIMENT, by Robert L. Chapkis. Rept. on Hypersonic Research Project, Contract DA 04-495-ORD-19. 1 May 59, 50p. 12 refs. Memo. no. 49.
Order from LC mi$3. 30, ph$7. 80 PB 142 170

By applying hypersonic approximations to Ferri's linearized characteristics method simple results were obtained for the shock shape and surface pressure distribution for an unyawed conical body of arbitrary cross-section. Calculations were carried out for an elliptic cone having a ratio of major to minor axis of 2: 1, and a semi-vertex angle of about 12^{o} in the meridian plane containing the major axis. Surface pressure distributions and schlieren photographs of the shock shape were also obtained at angles of attack up to 14^{o} at zero yaw, and at angles of yaw up to 10^{o}, at zero pitch.

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
OPERATION AND PERFORMANCE OF A SHOCK TUBE WITH HEATED DRIVER, by Robert C. Evans. Rept. on Hypersonic Research Project, Contract DA 04-495-ORD-19. 1 Feb 59, 34p. 5 refs. Memo.no. 48.
Order from LC mi$3. 00, ph$6. 30 PB 142 171

A shock tube was constructed with a drive section which could be heated with "Calrod" heaters to temperatures of approximately 300^{o} C. This temperature rise increased the shock wave Mach number by about 40 per cent, or from values of 7. 7 to 10 for pressure ratios of 20, 000 across the diaphragm. A transition section was designed to enable the major portion of the low pressure chamber to be constructed of round Shelby tubing, while the test section still had a flat top and a flat bottom. The flat surfaces are advantageous for optical studies and for convenience in instrumenting the tube. Despite the fact that the

transition was gradual, disturbances were present in the flow in the test section, 18 inches downstream of the transition section.

Illinois U. Engineering Experiment Station, Urbana.
POINT SOURCE TURBULENT DIFFUSION FOR AN AIR FLOW IN A DUCT, by Thomas J. Hanratty. Technical rept. no. 6 on Exploration and Application of Turbulence Theory, Contract DA 11-022-ORD-1707. Jan 58, 105p. 22 refs.
Order from LC mi$5.70, ph$16.80 PB 142 059

The turbulent diffusion process is examined by injecting hydrogen at the center of a three inch pipe into turbulently flowing air and by taking concentration traverses at distances downstream. The air velocity in the pipe was varied to determine how the diffusion rate varied over a Reynold's number range of from 9,700 to 87,000. The role of molecular diffusion on the turbulent diffusion process was examined by duplicating one of the runs using hydrogen which has a relatively high molecular diffusivity with a run using carbon dioxide with a low molecular diffusivity as the tracer gas. Taylor's point source theory was applied to the data obtained in the central section of the pipe where the flow is approximately homogeneous and isotropic. Values of $\overline{v^2}\tau$, $\overline{v^2}$, and τ were calculated. The applicability of different forms for the Lagrangian correlation coefficient was studied.

Institute for Cooperative Research, Johns Hopkins U., Baltimore, Md.
AN INVESTIGATION OF THE VISCOUS AND INERTIAL COEFFICIENTS FOR THE FLOW OF GASES THROUGH POROUS SINTERED METALS WITH HIGH PRESSURE GRADIENTS, by Eric Weger and D. B. Greenberg. Interim technical rept. no. 1 on Research on the Transient Response of Porous Media and Packed Beds to Large Thermal and Pressure Fluxes, Contracts DA 36-034-(-ORD-2353;-509-ORD-3). Mar 59, 97p. 18 refs. AD-213 897.
Order from LC mi$5.40, ph$15.30 PB 142 116

The permeability decreases significantly as the temperature of a sintered porous medium is increased. The inertial coefficient for any given core is found to be a constant within the pressure and temperature ranges which were covered by the present experiments.

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
FURTHER RESULTS ON THE FLOW OF A CONDUCTING FLUID PAST A MAGNETIZED SPHERE, by G. S. S. Ludford and J. D. Murray (Harvard U.). Rept. on Contract AF 49(638)154. June 59, 11p. 2 refs. Technical note BN-174; AFOSR-TN-59-648.
Order from LC mi$2.40, ph$3.30 PB 142 274

In this paper the general axially symmetric magnetic distribution is considered in more detail than in the previous report (PB-140 802). In particular, the drag for an off-center dipole is determined.

Institute of Engineering Research, U. of California, Berkeley.
AN OXYACETYLENE FLAME APPARATUS FOR SURFACE ABLATION STUDIES: DISTRIBUTION OF HEAT TRANSFER AND INITIAL ABLATION TESTS, by D. Wizansky, E. J. Russ, and W. H. Giedt. Technical rept. no. 2 on Contract DA 04-200-ORD-776. 26 May 59, 36p. 8 refs. HE-150-171; Series no. 128, issue no. 2.
Order from LC mi$3.00, ph$6.30 PB 142 251

An apparatus incorporating an oxyacetylene torch for producing surface ablation heating conditions along a specimen parallel to the direction of flame flow is described. Measurements of the heating rate distribution yielded a maximum value of 2×10^5 Btu/hr ft^2, which was about 25 percent higher than predicted. Initial ablation tests of glass reinforced plastic specimens (Micarta 259-2) with the laminates oriented in three different directions with reference to the hot gas stream are also described and discussed.

Institute of Research, Lehigh U. [Bethlehem, Pa.]
STUDY OF THE PROCESSES INDUCED BY THE REFLECTION OF STRONG SHOCKS IN NITROGEN, by Robert G. Jahn and Fred A. Grosse. Technical rept. no. 13, Sep 57-Aug 58, on Contract N7onr-393(02). 15 Sep 58, 40p. 9 refs.
Order from LC mi$3.00, ph$6.30 PB 140 990

Electrical and optical effects accompanying the reflection of Mach 6 shock waves in nitrogen from the end wall of a shock tube are studied experimentally by a series of complementary techniques involving thin-film resistance thermometers, internal and external electrostatic probes, 3 cm microwave absorption probes, spectrograms, photocells, interferograms and luminosity photographs.

[Institute of Engineering Research, U. of California, Berkeley].
TIME CONSTANTS FOR VACUUM GAGE SYSTEMS, by S. A. Schaaf and R. R. Cyr. Rept. on Fluid Flow and Heat Transfer at Low Pressures and Temperatures, Contract N7onr-295(03). 13 Mar 48, 14p. 3 refs. Rept. no. HE-150-42; ATI-66 210.
Order from LC mi$2.40, ph$3.30 PB 142 255

Johns Hopkins U. [Baltimore, Md.]
ANOTHER UNSTEADY TURBULENT BOUNDARY LAYER, by Hendrik Tennekes. Rept. on Contract AF 49(638)496. May 59, 43p. 10 refs. AFOSR-TN-59-600; AD-217 177.
Order from LC mi$3.30, ph$7.80 PB 142 245

An investigation of a zero mean pressure gradient turbulent boundary layer, subjected to sinusoidal free stream oscillations, was undertaken by Karlsson. It was found that this boundary layer responded, within experimental scatter, linearly. The present paper contains a comparison of Karlsson's data with the results of Lighthill for the corresponding laminar layer.

Johns Hopkins U., Baltimore, Md.
SHOCK WAVE-TURBULENCE INTERACTION, INVESTIGATIONS IN A SHOCK TUBE, by Jack Eli Werner. Final rept. on Contract AF 18(600)757. May 59, 178p. 15 refs. AFOSR TR-59-46; AD-214 847.
Order from LC mi$8.10, ph$27.30 PB 142 303

Various aspects of the shock-turbulence interaction problem have been investigated analytically and experimentally. The model of a cellular vortex field with a discrete front convected through a shock wave has been studied theoretically. Expressions have been derived for the unsteady pressure disturbance on the downstream face of the shock, and the displacement of the shock wave itself as the vortex field is carried through it by the mean flow. The interaction of a shock with a random velocity fluctuation field has also been considered. The relationship between pressure fluctuation and shock displacement has been explored. In particular the pressure fluctuation level is found to depend on shock displacement, turbulence scale, and turbulence intensity. Techniques for measuring these three quantities in a shock tube are the subject of the experimental work.

Laboratorio di Meccanica Applicata del Politecnico di Torino (Italy).
AERODYNAMIC FIELD NEAR THE STAGNATION POINT OF A BLUNT [SYMMETRICAL] AIRFOIL IN HYPERSONIC FLOW WITH γ NEAR UNITY, by Aldo Muggia. Technical note 13 on Contract AF 61(514)1124. Feb 59, 17p. 2 refs. AFOSR-TN-59-339; AD-213 660.
Order from LC mi$2.40, ph$3.30 PB 142 262

Laboratorio di Meccanica Applicata del Politecnico di Torino (Italy).
ON NON-STEADY TRANSONIC FLOWS PAST SYMMETRICAL AIRFOILS. PART II: APPROXIMATE SOLUTION, by Carlo Ferrari. Technical note 7 on Contract AF 61(514)1124. Jan 58, 13p. 1 ref. AFOSR-TN-58-320; AD-154 223.
Order from LC mi$2.40, ph$3.30 PB 142 228

The extreme complication offered by the study of non-stationary transonic flow, even if carried out according to the hodographic method (as it will be apparent from the 1st part hereof, causes it to appear not altogether useless to seek a solution based on the application of rough simplifications, which however in similar problems have afforded results satisfactory enough, that is to say not much different from those given by more accurate methods and by experiments. For this reason, the problem considered in the 1st section is again examined, and for its study there is used a method similar to that followed by John R. Spreiter and Alberta Y. Alksne for the corresponding problem in stationary conditions. (See also PB 142 227)

Laboratorio di Meccanica Applicata del Politecnico di Torino (Italy).
ON NON-STEADY TRANSONIC FLOWS PAST SYMMETRICAL AIRFOILS. PART I: APPLICATION OF THE HODOGRAPHIC METHOD, by Carlo Ferrari. Technical note 6 on Contract AF 61(514)1124. Jan 58, 32p. 5 refs. AFOSR-TN-58-321; AD-154 224.
Order from LC mi$3.00, ph$6.30 PB 142 227

The purpose of this work is the determination of the two-dimensional flow past an airfoil placed in a stream of inviscid fluid, uniform to the infinity, under the following conditions: (a) The stream at infinity, referred to a system of axes (x^*, y^*), has a speed U_∞ and a Mach number $M_\infty < 1$ which is sufficiently high so that a supersonic region exists; (b) the symmetrical airfoil starting from a given instant, which will be conventionally considered as initial, has a translatory motion [referred to the same system (x^*, y^*)] in the direction of its symmetry axis.

Laboratorio di Meccanica Applicata del Politecnico di Torino (Italy).
ON THE STEADY AND NON-STEADY TRANSONIC FLOW WITH ATTACHED SHOCK WAVE ($M_\infty < 1$): NEW RESULTS AND CONJECTURES, by Carlo Ferrari. Technical note 12 on Contract AF 61(514)1124. Feb 59, 31p. 6 refs. AFOSR-TN-59-338; AD-213 659.
Order from LC mi$3.00, ph$6.30 PB 142 261

Massachusetts Inst. of Tech., Cambridge.
THE DETERMINATION OF AIRCRAFT STABILITY COEFFICIENTS FROM FLIGHT TEST DATA. PART I. THEORETICAL CONSIDERATIONS, by Lloyd E. Wilkie, Meredith N. Springer, and Luciano L. Mazzola. Rept. on Contract AF 33(616)3064. Apr 58, 157p. 36 refs. WADC Technical note 57-410, Pt. 1; AD-213 869.
Order from OTS $3.00 PB 151 903

This report discusses three general problems associated with the extraction of stability coefficients from flight-test data involving large-amplitude motions. They are the determination of an adequate mathematical model of the dynamic system, the selection of the appropriate technique for the extraction of the coefficients, and a knowledge of the exact number of unknown coefficients which can be theoretically determined from any given response.

Massachusetts Inst. of Tech., Cambridge.
THE DETERMINATION OF AIRCRAFT STABILITY COEFFICIENTS FROM FLIGHT-TEST DATA. PART 2. LONGITUDINAL INVESTIGATIONS, by Lloyd E. Wilkie and Meredith N. Springer. Rept. on Contract AF 33(616)3064. Apr 58, 147p. 14 refs. WADC Technical note 57-410, Pt. 2; AD-213 870.
Order from OTS $2.75 PB 151 926

The longitudinal stability coefficients in the Z-force and pitching-moment equations were extracted from digitally-simulated aircraft responses by the integral method of Shinbrot, the derivative method, and a new statistical method. The effects on the longitudinal extraction accuracy of response data accuracy, the time increment between data points, the length of the response data, and the variations of parameters in the methods were investigated. It was found that all three extraction methods produced roughly the same extraction accuracy though the new statistical method

extracted the nonlinear aerodynamic functions in the region of pitch-up better than the derivative and integral methods. (See also PB 151 903)

Massachusetts Inst. of Tech., Cambridge.
THE DETERMINATION OF AIRCRAFT STABILITY COEFFICIENTS FROM FLIGHT-TEST DATA. PART 3. LATERAL INVESTIGATIONS, by Luciano L. Mazzola and Mary Ellen Hoult. Rept. on Contract AF 33(616)3064. July 58, 78p. 5 refs. WADC Technical note 57-410, Pt. 3; AD-213 871.
Order from OTS $2.00 PB 151 927

The lateral stability coefficients in the yawing and rolling moment equations were extracted from digitally simulated aircraft responses by the integral method of Shinbrot, the derivative method and a new statistical method. The effects on the lateral extraction accuracy of response data precision, the time increment between data points, and the length of the response data interval were studied. It was found that all three extraction methods provided approximately the same extraction accuracy. (See also PB 151 926)

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF CERTAIN UNSTEADY AERODYNAMIC EFFECTS IN LONGITUDINAL DYNAMIC STABILITY, by H. Ashley, G. Zartarian, and D. O. Neilson. Rept. on Aeroelasticity and Unsteady Flow Effects on Stability, Contract AF 33(038)11668. Dec 51, 334p. 64 refs. USAF Technical rept. no. 5986; ATI-170 202.
Order from LC mi$11.10, ph$54.60 PB 142 286

The research reported herein comprises three phases, all directed at developing and applying to various examples a precise method for computation of low-speed longitudinal response of aircraft. Firstly, unsteady aerodynamic theory is reviewed and extended to cover oscillations of straight and swept wings of finite span, bodies, and wing-body combinations. Simplified schemes are given for calculating unsteady downwash behind finite wings and forces on slender bodies in arbitrary motion. Secondly, coordinated series of wind-tunnel measurements on oscillating straight and swept wings and bodies are presented. Most theoretical results appear confirmed, and straightforward means are suggested for modifying the theory where discrepancies occur. Finally, the most exact practicable aerodynamic expressions are used in calculating longitudinal response to elevator oscillation for twenty rigid and flexible aircraft representing a wide range of parameters. It is shown that, in the short-period frequency range, the predictions compare well with those of much simpler theory, especially for short tail lengths and large static stabilities. At low speeds the introduction of structural flexibility has relatively little effect on the pitching and heaving velocities in the two cases studied, except near certain natural frequency peaks. To extend the usefulness of the curves, an approximate graphical procedure is demonstrated for finding response to arbitrary elevator input.

Massachusetts Inst. of Tech., Cambridge.
SHOCK-WAVE OSCILLATIONS IN SUPERSONIC FLOW, by John W. Ellingwood, Leon Trilling, and J. Frederick White. Rept. on Flight Control Technical Requirements, Contract AF 33(616)3064. Dec 57, 68p. 6 refs. WADC Technical note 57-409; AD-213 868.
Order from OTS $1.75 PB 151 902

This report presents the results of three investigations of oscillating shock waves. "Oscillating Shock Boundary Layer Interaction" by Leon Trilling is a theoretical study in which the stability to small disturbances of the interaction of a shock wave with a laminar boundary layer is investigated. It is found that for any local Mach number above 1.5 and for any Reynolds number there is a combination of frequency and shock strength for which shock oscillations are neutrally stable. Stability boundaries are presented. "Experiments in Oscillating Shock Boundary Layer Interaction" by Joseph Frederick White describes the design and testing of a mechanism to generate oscillating shock waves in a wind tunnel. Some preliminary measurements obtained with this mechanism are presented, and experimental requirements for a more comprehensive program are suggested. "Unsteady Lifting Airfoils at High Subsonic Speeds" by John Webster Ellingwood is a theoretical study of unsteady aerodynamic forces and critical frequencies for airfoils at small angles of attack oscillating in nonviscous flows. A theory based on a simplified mathematical model is derived, and a sample calculation is presented and discussed.

Massachusetts Inst. of Tech., Cambridge.
A STATISTICAL METHOD FOR THE EXTRACTION OF STABILITY PARAMETERS FROM THE FLIGHT-TEST DATA, by Meredith N. Springer. Rept. on Contract AF 33(616)3064. Dec 57, 101p. 8 refs. WADC Technical note 57-408; AD-213 867.
Order from OTS $2.50 PB 151 901

The problem of determining from flight-test data the forces and moments acting on an aircraft is analyzed from a statistical point of view. General expressions containing unknown parameters are assumed giving the forces and moments as functions of the variables that characterize the motion of the aircraft. A new method is developed for evaluating from flight test data these and other parameters (e.g., moments of inertia) in the resulting equations of motion. This method is based on a statistical technique for estimating unknown parameters in probability density functions from samples of observed data. This statistical technique, maximum-likelihood estimation, gives the theoretically "best" estimates for unknown parameters in a wide variety of situations. Approximations are used for the responses as functions of the unknown parameters since these functions cannot usually be evaluated explicitly. The method is thereby made applicable to most aircraft-parameter-determination problems. It is applicable to both linear and nonlinear systems and may be used to determine the value of any parameter occurring linearly in the equations of motion, subject only to limitations preventing the determination of certain parameters by any method. The method can readily be coded for a digital computer, and a possible sequence of computational steps is included in this report. Testing the adequacy of the hypothesis that the assumed functions give the true forces and moments is discussed, and an error analysis is included.

Michigan U. Research Inst., Ann Arbor.
ELECTRICAL BREAKING OF SHOCK-TUBE DIAPHRAGMS, by A. L. Cole, A. C. Hunting and D. L. Upham. Progress rept. on Contract Nonr-1224(18). Sep 58, 23p. 10 refs. 2539-25-P.
Order from LC mi$2.70, ph$4.80 PB 142 032

A new method is described for breaking shock-tube diaphragms by means of electrical discharge. The total time required for the discharge to occur and for the diaphragm to be effectively broken depended on the diaphragm material and thickness, and on the differential pressure across it; the time ranged from 300 to 700 microsec. The repeatability with which the resulting shock could be placed in our viewing section was such that the mean deviation of the total diaphragm-breaking time was generally <70 microsec. This permitted the entire process to be timed with respect to another shock with sufficient accuracy that photographic studies of shock collisions in the shock tube were practicable. Thus far, shocks in N_2 of strengths from y=2 to y=4 have been produced. The detailed mechanism of the rupturing process is studied. Some preliminary results are reported of work directed toward improving the repeatability of the generating process and the uniformity of the flow behind the shock.

Mississippi State Coll., State College.
CORRELATION OF SEVERAL METHODS FOR DETERMINING SKIN FRICTION IN A TURBULENT FLOW, by James Earl Bailey. Research rept. no. 16 on Contract Nonr-978(01). 11 Aug 58, 53p. 10 refs.
Order from LC mi$3.60, ph$9.30 PB 142 392

The values of skin friction that were determined by the pressure drop down the pipe, Cornish's method, Clauser's method, and the Preston tube showed good agreement for a turbulent pipe flow. It was found that the turbulent pipe flow profiles modified by suction were defined by the universal relation in the region very close to the wall if the value of $U\tau$ determined by Cornish's method was used. The values of skin friction determined by Cornish's method, Clauser's method, and the Preston tube for the turbulent boundary layer modified by suction were in agreement. The values of skin friction determined by the three methods based on the "Law of the Wall" were in agreement among themselves, and the universal logarithmic relationship, using the value of $U\tau$ for the suction case, fell on the same curve as the pipe flow profiles in the region near the wall. This may be interpreted as evidence that the "Law of the Wall" is valid for the suction case.

National Aeronautical Establishment (Canada).
EFFECT OF STANDING VORTEX ON FLOW ABOUT SUCTION AEROFOILS WITH SPLIT FLAPS, by P. Mandl. 14 Jan 59, 51p. 4 refs. Aeronautical rept. LR-239.
Order from LC mi$3.60, ph$9.30] PB 142 415

This investigation extends the theory of flow about suction aerofoils with split flaps to take account of the standing vortex within the angle between aerofoil and flap. The strength and the equilibrium position of the vortex are calculated by applying the Kutta condition both at the trailing edge of the aerofoil and at the tip of the flap. It is shown that the standing vortex increases the lift coefficient. Stream lines are calculated for a particular configuration of aerofoil and split flap for which flow pictures were available. The calculated flow pattern indicates the existence of a cavity which is mainly influenced by the vortex and the sink. The stream lines inside and outside the cavity agree well with experiment.

Polytechnic Inst. of Brooklyn, N. Y.
INTERFERENCE OF BODY AND TRAILING EDGE VORTEX SHEET IN SUPERSONIC FLOW, by Shinya Kobayakawa and Lu Ting. Rept. on Contract AF 49(638)445. May 59, 35p. 6 refs. PIBAL rept. no. 516; AFOSR-TN-59-453; AD-215 028.
Order from LC mi$3.00, ph$6.30 PB 142 264

It is shown that the integral equation is still valid if the region ahead of the Mach plane contains a vortex sheet-like discontinuity surface; that is, a cylindrical surface with generator parallel to the undisturbed flow and across which the pressure and normal velocity are continuous. With this extension the integral equation is applied to obtain an approximate solution to the pressure distribution on the body surface which lies in the domain of influence of the trailing edge in a manner similar to that employed for the dihedral and the wing-body interference problem. For the present problem, an alternate form of the integral relationship is derived so that the range of integration is substantially reduced.

Polytechnic Inst. of Brooklyn, N. Y.
ON THE INTEGRAL OF MOMENT OF PRESSURE IN SUPERSONIC FLOW, by Lu Ting. Rept. on Contract AF 49(638)217. May 59, 18p. 4 refs. PIBAL rept. no. 449; AFOSR-TN-59-358; AD-213 684.
Order from LC mi$2.40, ph$3.30 PB 142 238

The integral of the moment of the disturbance pressure along the line of the interaction of a Mach plane with the cylindrical surface, whose generator is parallel to the undisturbed stream, is shown to be related to the integral of the moment of the prescribed normal velocity along the same line. Its applications in problems of planar systems and wing-body combinations at supersonic speed are presented.

Rensselaer Polytechnic Inst., Troy, N. Y.
INVISCID FLOW FIELD AROUND A BLUNT BODY AT HYPERSONIC SPEEDS. PART I. THE STAGNATION POINT REGION, by Ting Yi Li. Rept. on Contract AF 18(600)1591. 7 Sep 57, 73p. 15 refs. TR AE 5706; AFOSR TN-57-758; AD-136 747.
Order from LC mi$4.50, ph$12.30 PB 139 444

The inviscid hypersonic flow in the stagnation point region on a blunt body of revolution has been studied, with particular emphasis on finding out the effects of the body curvature. The flow field is assumed to be at thermodynamic equilibrium. Density variation within the shock layer is neglected and the shock layer thickness is taken to be constant in the stagnation point region. In the blunt nose region, the differential equation for the stream function is derived. Various levels of approximation are applied to this differ-

ential equation, and solutions are obtained. The analysis has been carried out in the body-oriented orthogonal curvilinear coordinates used in the recent work of Li-Geiger. A stagnation point approximation solution is obtained.

Rensselaer Polytechnic Inst., Troy, N. Y.
SURFACE EFFECTS ON THE SUPERCAVITATING FLOW PAST A SYMMETRIC WEDGE, by R. C. DiPrima and Yih-O Tu. Rept. on Contract Nonr-591(08). 22 Aug 58, 16p. 9 refs. RPI MathRep no. 17.
Order from LC mi$2.40, ph$3.30 PB 142 055

Tulin has recently used a linearized theory to treat two dimensional cavity flows in an unbounded stream. Other authors have used and generalized the linear theory. In this paper the linear theory is used to treat the supercavitating flow past a slender wedge placed near a free surface or a solid wall - the body axis of the wedge is parallel to the undisturbed flow and to the solid wall or the undisturbed free surface.

Rome U. (Italy)
MODELING TECHNIQUE AND THEORY FOR AEROELASTIC SIMILARITY IN BLOW-DOWN WIND TUNNEL TESTS, by Luigi Broglio. Technical note no. 3 on Contract AF 61(514)888. Mar 58, 135p. 3 refs. SIARgraph no. 30; AFOSR TN-58-902; AD-204 283.
Order from LC mi$6.90, ph$21.30 PB 137 452

A general approach to solve similarity problems in aeroelastic phenomena for testing wing models and wing-tail combinations at the blow-down high pressure wind tunnel is presented. Theoretical methods and experimental devices to be used for this purpose are reported. The results of various series of tests at $M = 3.01$ and at two Reynolds numbers of $20 \cdot 10^6$ and $40 \cdot 10^6$ on a wing model and on a wing-tail combination for three cases of different materials, with the same planform, are presented. A comparison with the theoretical values is also presented.

Stanford U., Calif.
A STUDY OF EXPERIMENTAL FACILITIES FOR THE INVESTIGATION OF THE STRUCTURAL EFFECTS OF HYPERSONIC FLOW, by J. F. Besseling, W. G. Vincenti and N. J. Hoff. Final technical rept. on Contract Nonr-225(30). Jan 58, 80p. 23 refs. AD-153 876.
Order from LC mi$4.50, ph$12.30 PB 142 149

One of the most important tools to be used in the exploration of the new phenomena is the high-temperature hypersonic wind tunnel. It was the purpose of this contract to examine the new problems posed to the structures expert by these hypersonic vehicles and to find the type of wind tunnel best suited to the exploration of these problems. This report enumerates some of the problems whose solution is urgently needed. It compares the various wind tunnel types and related facilities and reaches the conclusion that the blow-down tunnel, with a capacity heater, is best suited for the investigations proposed. A reasonably detailed analysis of the blow-down tunnel is followed by a cost estimate of the facility.

Technische Hochschule, Munich (West Germany).
ON THE VALIDITY OF THE "THEOREM OF EQUIVALENCE" AND THE AREARULE IN SUPERSONIC FLOW, by Wolfgang Werner. Technical note no. 4 on Contract AF 61(514)1080. 28 Mar 58, 26p. 4 refs. AFOSR TN-58-361; AD-154 266.
Order from LC mi$2.70, ph$4.80 PB 142 389

This paper presents investigations on the validity and applicability of the "theorem of equivalence" as stated by F. Keune and K. Oswatitsch and its consequences for the supersonic drag of "equivalent bodies". It will be shown that the theorem of equivalence is not valid as general as it has been assumed. In part II the flow potential of a body with source-sink distribution in a plane of symmetry will be discussed. In part III it will be investigated how experimental results known as the "area-rule" can be affirmed by our theory. In part IV the theoretical results will be compared with the results of a numerical computation carried out by the electronic computer PERM at the Münchner Technische Hochschule.

University of Southern California, Engineering Center, Los Angeles.
SOME LIMITATIONS OF REVERSIBLE HEAT ADDITION TO A ONE-DIMENSIONAL SUPERSONIC FLOW, by Earl Beder. Rept. on Contract AF 40(600)736. July 59, 34p. 3 refs. AEDC-TN-59-70.
Order from LC mi$3.00, ph$6.30 PB 142 313

Reversible heat addition to a steady one-dimensional supersonic flow is analyzed to determine some limitations of volume-distributed heat sources, such as radiation, plasma decay, and chemical reaction. Partial solutions are obtained for various assumed physical restraints such as constant pressure, constant Mach number, etc. The specific mechanism of the heat source is not used. Composition and specific heats are held constant. It is shown that the constant Mach number flow is quite satisfactory for continuous-flow wind tunnel heating.

Statics, Kinematics, and Kinetics

Duke U., Durham, N. C.
PROPAGATION OF THERMAL STRESSES IN THE SEMI-INFINITE MEDIUM, by F. J. Lockett. Rept. on Contract AF 18(600)1341. Apr 59, 14p. 11 refs. AFOSR-TN-59-498; AD-215 923.
Order from LC mi$2.40, ph$3.30 PB 142 359

Solutions are derived, using the classical theory of thermoelasticity, to the problem of the semi-infinite medium subjected to any physically possible combination of body forces, heat sources, surface tractions and thermal boundary conditions. The solutions are obtained in the form of multiple integrals over an infinite range, and in the general case they would have to be reduced by numerical procedures. A particular example is given in which the solutions reduce to a simple form. Results show that a stress component of physical importance differs from the classical value by a maximum amount of 5%.

Minnesota U., Minneapolis.
THE EFFECT OF CONFIGURATIONAL ADDITIONS USING VISCOELASTIC INTERFACES ON THE DAMPING OF A CANTILEVER BEAM, by James S. Whittier. Rept. for Mar-July 58 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5426. May 59, 67p. 11 refs. WADC Technical rept. 58-568; AD-214 381.
Order from OTS $1.75 PB 151 883

A quasi-static analysis of a cantilever beam damped by an added configuration involving viscoelastic interfaces is presented. Optimum values of viscoelastic damping are calculated and compared with calculated values of damping due to hysteresis of the structural material of a plain beam. Experimental data show fair agreement with the theory both as to order of magnitude and trends toward optimum values.

Minnesota U., Minneapolis.
RESPONSE OF BARS (WITH INTERNAL AND BOUNDARY DAMPING) TO TRANSIENT AND RANDOM EXCITATION, by Robert F. Lambert. Rept. for June-Aug 58 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5426. May 59, 32p. 4 refs. WADC Technical rept. 58-569; AD-214 382.
Order from OTS $1.00 PB 151 884

Theoretical analysis of the effects of internal and boundary damping on the forced vibrations of a uniform bar is carried out using perturbation techniques. A first order correction to the poles of the response function is obtained and the dependence upon frequency noted. It turns out that the real part (damping factor) will in general vary with frequency and hence mode number. The results virtually insure that all response functions (displacement, moment, strain) for random excitation obtained using a generalized Foruier series analysis will converge for Brownian motion excitation.

National Aeronautical Establishment (Canada).
ANALYSIS OF A CANTILEVER BEAM DEVELOPING AN ISOPLASTIC RESPONSE UNDER IMPACT AT THE TIP, by A. H. Hall and V. L. Saxon. May 59, 18p. 1 ref. Aeronautical rept. LR-237.
Order from LC mi$2.40, ph$3.30 PB 142 416

A condition of isoplasticity is defined for a beam as the development of plastic strains simultaneously at all points along the profile fibers. Two conditions must be satisfied simultaneously, one on the profile shape, and one on the mass distribution. It appears that the second condition can only be approximately satisfied if there is a relatively large mass concentration at the tip. Preliminary experiments using a massive striking force on a statically constant stress cantilever indicate that a condition of isoplasticity may be approached.

Polytechnic Inst. of Brooklyn, N. Y.
CREEP BEHAVIOR OF COLUMNS, by Sharad A. Patel and B. Venkatraman. Rept. on Contract AF 49(638)302. May 59, 89p. 37 refs. PIBAL rept. no. 422; AFOSR TN-59-530; AD-216 537.
Order from LC mi$4.80, ph$13.80 PB 142 410

The present work is concerned with the investigation of the creep behavior of pin-ended columns, viscous and visco-elastic columns, plastic deformations, short-time buckling, critical time. Good approximation may be obtained with the use of an equivalent I-section and the neglect of higher harmonic deflection components.

Polytechnic Inst. of Brooklyn, N. Y.
STRESS ANALYSIS OF SOLIDS WITH LARGE TEMPERATURE VARIATIONS, by J. R. M. Radok. Rept. on Contract Nonr-839(23). Sep 58, 16p. 7 refs. PIBAL rept. no. 482.
Order from LC mi$2.40, ph$3.30 PB 142 341

Royal Inst. of Tech. (Sweden).
MEASURING ACCURACY IN CREEP TESTS. PART 1. INFLUENCE OF ECCENTRICITY OF LOAD, by Arne Mellgren. Rept. for July-Nov 58 on Materials Analysis and Evaluation Techniques, Contract AF 61(052)05. July 59, 28p. 3 refs. WADC Technical rept. 59-78, Pt. 1; AD-216 357.
Order from OTS $0.75 PB 151 928

In the course of an ordinary uniaxial creep test several sources of error may be operative, resulting in test data that are not representative of the real properties of the test material. A primary source for error is loading eccentricity which is the subject of Part I of this report series. In this report the author determines the influence that each of several types of loading eccentricities has upon the observed secondary creep rate. Consideration is given to non-uniform creep due to eccentrically applied loads which includes initial and time dependent eccentricity, curved test specimens, and asymmetric location of the extensometer. Non-uniform creep due to inhomogeneous materials and non-uniform temperature distribution across the specimen cross section causing eccentric loading, is also presented. The error introduced by each is formulated and discussed.

Watertown Arsenal Labs., Mass.
BUCKLING CHARACTERISTICS OF CORRUGATED CYLINDERS. PART I. THE EFFECT OF LENGTH UPON THE BUCKLING LOAD OF CORRUGATED CYLINDERS, by Joseph F. Cheatham. Feb 59, 25p. Technical rept. no. WAL TR 715/3; AD-210 869.
Order from LC mi$2.70, ph$4.80 PB 142 430

The investigation was concerned with the variation of buckling stress with height. This study was undertaken to determine an adequate design criteria for the buckling of corrugated cylinders.

Watertown Arsenal Labs., Mass.
AN ELASTIC-PLASTIC SOLUTION FOR THE STRIP WITH A CENTRAL HOLE, by E. W. Ross, Jr. Apr 59, 29p. 1 ref. Technical rept. no. WAL TR 885/1; AD-213 479.
Order from LC mi$2.70, ph$4.80 PB 142 429

This paper treats the problem of a thin strip of material with a very large hole in it, pulled in uniaxial tension. The analysis follows the beam-like approximation made by Koiter and is extended into

the plastic-elastic range, up to a load of about 1.47 times the load at which local plastic action begins at the minimum sections. A brief discussion on the validity of the theory is presented.

METALLURGY

Armour Research Foundation, Chicago, Ill.
THE DEVELOPMENT OF THERMOCOUPLES, by R. M. Curcio. Rept. memo. no. 2 for 20 Jan-18 Feb 48. 20 Feb 48, 10p. NEPA 551-ARM-3: AD-204 055.
Order from LC mi$1.80, ph$1.80 PB 137 341

Armour Research Foundation, Chicago, Ill.
THE DEVELOPMENT OF HIGH TEMPERATURE THERMOCOUPLES, by Gary Steven and Walter C. Troy. Rept. memo. no. 11, 16 Oct-16 Nov 48. 19 Nov 48, 7p. NEPA 834-ARM-12; AD-204 052.
Order from LC mi$1.80, ph$1.80 PB 137 342

Chicago Development Corp., Riverdale, Md.
ELECTROLYTIC TITANIUM ALLOY METAL CRYSTALS: EXPERIMENTAL PRODUCTION OF 8% MANGANESE-TITANIUM AND 1-2% VANDIUM-TITANIUM ALLOYS DIRECTLY IN THE ELECTROLYTIC CELL. ELECTROLYTIC TITANIUM NO. 2: ELECTROLYTE EQUILIBRIA AND ELECTRODE BEHAVIOR IN THE SOLUBLE ANODE TITANIUM PROCESS, by R. S. Dean, W. W. Gullett and others. Final rept. on Contract NOas 59-4131F. 12 Jan 59, 42p. 14 refs.
Order from LC mi$3.30, ph$7.80 PB 142 115

The production of the alloys in relatively coarse crystals of high purity, particularly with respect to the oxygen content was called for. Properties of titanium alloys of 8% manganese and titanium-vanadium were determined.

Massachusetts Inst. of Tech., Cambridge.
FINE PARTICLE STRENGTHENING FOR HIGH TEMPERATURE USE, by William Schwarzkopf and Nicholas J. Grant. Rept. on Solid State Research, Contract AF 33(616)5424. Dec 58, 18p. 19 refs. WADC Technical rept. 58-640; AD-212 312.
Order from OTS $0.50 PB 151 863

Various methods of achieving a fine dispersion of a hard insoluble particle in a pure metal or low alloy matrix are reviewed. Comparison is made among the systems on the basis of the ratio of the test temperature to the absolute melting temperature. The promise offered by internal oxidation of dilute solutions in which the solute element forms a stable refractory oxide is illustrated by recent work with nickel-aluminum solid solutions, with testing of the alloys at 816° C (1500° F).

Naval Research Lab., Washington, D. C.
THE ALUMINUM-SILICON EUTECTIC, by R. A. Meussner. 26 June 59, 12p. 8 refs. NRL rept. 5331.
Order from OTS $0.50 PB 151 735

The eutectic of the aluminum-silicon system has been redetermined as 12.7 w/o Si at 577.2°C. Thermal data support the recently reported 12.5 w/o Si eutectic composition and thus refute the generally accepted value of 11.7 w/o Si. However, equilibration studies have shown that both branches of the liquidus are inexactly defined by thermal analysis data and, as a consequence, the eutectic composition obtained by the extrapolation of these data must be in error.

Ferrous Metals

Columbia U., New York.
INTERNAL FRICTION STUDY OF COLD WORKED IRON CONTAINING NITROGEN, by Donald Petarra. Rept. on Contract AF 49(638)408. Apr 59, 31p. 8 refs. AFOSR-TN 59-270; AD-212 704.
Order from LC mi$3.00, ph$6.30 PB 142 004

A mechanism explaining the complex behavior 220°C peak height as a function of annealing temperature has been advanced. It has been shown that the recovery process directly affects the height of the 220°C internal friction peak, and indirectly affects the height of the room temperature internal friction peak. The intimate relationship between these two peaks is brought out.

Detroit Arsenal, Center Line, Mich.
SURVEY AND ANALYSIS OF FACTORS INVOLVED IN HIGH VOLTAGE FLUOROSCOPY, by R. A. Pulk and Fred Seppi. Final rept. 3 Oct 58, 168p. 16 refs. Rept. no. 4311.
Order from LC mi$7.80, ph$25.80 PB 139 591

In order to determine the value of conventional fluoroscopy and televised fluoroscopy with ferrous materials, a series of radiographs, fluorographs, and televised fluorographs were taken. Definite techniques were established for direct fluoroscopy of steel sections up to 3/4-inch thick. For section sizes up to 1-1/2 inches, the sensitivity decreases markedly with fluorescent screens. However, improvement of results in this range by the image intensifier and refined techniques will definitely increase sensitivity to a satisfactory quality control level.

Illinois U., Urbana.
COMPARISON OF THE FATIGUE BEHAVIOR OF LEADED AND NON-LEADED AISI 4340 STEEL AT HIGH HARDNESS LEVELS, by J. R. Suhre and G. W. Brock. Rept. on Contract NOrd-17735. Feb 59, 45p. 12 refs. T. and A.M. rept. no. 570.
Order from LC mi$3.30, ph$7.80 PB 140 986

Lead additions had little effect on the tensile properties of the material. The mean fatigue limit of smooth

specimens was decreased slightly at all strength levels above 103,000 psi. Lead additions did not appear to substantially effect the fatigue life of specimens tested at stress levels above the mean fatigue limit.

Rodman Lab., Watertown Arsenal, Mass.
MACHINING CHARACTERISTICS OF LEADED STEEL, by Fenton L. Bagley, Jr. and Roy Mennell. Feb 59, 53p. 17 refs. Rept. no. RPL 23/6.
Order from LC mi$3.60, ph$9.30 PB 142 078

A range of cutting speeds (from 50 to 800 feet per minute) and workpiece hardness (from 230 to 450 Bhn) were investigated on one workpiece material (4340) using principally a carbide (C-6) cutting tool. The effects of lead include decreased machining coefficient of friction, increased shear angle, decreased shear energy, and lower cutting forces below the critical speed.

Springfield Armory, Mass.
INFLUENCE OF ALUMINUM ADDITIONS UPON PROPERTIES OF INVESTMENT CASTINGS, by J. F. Panda. Rept. on Application of Cast Materials and Processes to the Manufacture of Small Arms Weapon Items. 16 Feb 59, 17p. Rept. SA-TR19-1003.
Order from LC mi$2.40, ph$3.30 PB 142 283

Impact properties and types of fractures of heat-treated investment castings when varying amounts of aluminum are added to the melt for deoxidation on 4150 and Cr-Mo-V steels.

Watertown Arsenal Labs., Mass.
CORRELATION OF SELECTED SUBSIZE CHARPY BARS VERSUS THE STANDARD CHARPY BAR, by Charles H. Curll and George M. Orner. Rept. on Industrial Preparedness Measure, Development of Subsize Charpy Standard. May 58, 16p. 3 refs. Technical rept. WAL TR 112/91.
Order from LC mi$2.40, ph$3.30 PB 138 548

To provide a means of impact acceptance testing of specimens which must be obtained from thin sections, a study was made of the Charpy V notch impact properties of steels over a range of temperatures encompassing transitions from ductile to brittle behavior in various specimen sizes. The test data reveal a non-linear relationship between the energy required to fracture standard-size and given subsize V notch Charpy specimens outside the transition temperature range for the steels investigated.

Watertown Arsenal Labs., Mass.
ULTRASONIC ATTENUATION IN SAE 3140 AND 4150 STEEL, by Emmanual P. Papadakis. Apr 59, 93p. 23 refs. Technical rept. 143/31; AD-213 478.
Order from LC mi$5.40, ph$15.30 PB 142 424

The attenuation of longitudinal ultrasonic waves is studied by the pulse technique in blocks of SAE 3140 and 4150 steel to determine the loss mechanism and to find possible methods for precision testing the microstructure of materials. It is found that scattering by the grains in the polycrystalline steel is responsible for the attenuation in tempered steel. The critical quantities are the grain diameter and the average squared fractional variation in the elastic modulus of a single grain. Diffraction corrections and other items relevant to ultrasonic attenuation measurements are mentioned.

Light Metals

Alloyd Research Corp.
RESEARCH ON TECHNIQUES FOR THE PRODUCTION OF ULTRA-PURE BERYLLIUM, by Joseph L. Lukesh, Laurence McD. Schetky and others. Rept. for 1 July 57-30 June 58 on Metallic Materials, Contract AF 33(616)5300. Feb 59, 45p. 16 refs. WADC Technical rept. 58-457, Pt. 1; AD-208 662.
Order from OTS $1.25 PB 151 878

The brittleness problem of beryllium is described and the empirical and theoretical approaches to its solution discussed. The Alloyd Research Corporation program for the production of very high purity beryllium is described in detail. Experimental results are outlined, conclusions are drawn, and recommendations for future work presented.

Armour Research Foundation [Chicago, Ill.]
STUDIES OF PHASE RELATIONSHIPS AND TRANSFORMATION PROCESSES OF TITANIUM-ALLOY SYSTEMS, by D. J. McPherson and W. Rostoker. Rept. for 11 Jan-11 Oct 54 on Metallic Materials, Contract AF 33(616)2351. Apr 55, 72p. 16 refs. WADC Technical rept. 54-101, pt. 2; AD-75 186.
Order from LC mi$4.50, ph$12.30 PB 142 056

In relation to the study of possible age hardening systems, vertical sections of the partial ternary systems, Ti-2% Cr-C, Ti-3% Mo-C and Ti-4% V-C, are reported. The phase relations studies in connection with possible dispersion or age hardening due to additions of boron, beryllium, carbon, or silicon to the base compositions Ti-2% Cr, Ti-3% Mo, and Ti-4% V are summarized. Beryllium offers the most promise as an additive to produce dispersion or age hardening from the standpoint of being able to control structure and properties through solution heat treating followed by aging. (See also PB 135 195)

Case Inst. of Tech., Cleveland, Ohio.
PRESSURE DERIVATIVES OF THE ELASTIC CONSTANTS OF ALUMINUM AND MAGNESIUM TO 6,500 BARS, by Richard E. Schmunk. Doctoral thesis. Technical rept. no. 2 on Contract Nonr-1141(05). Sep 58, 38p. 21 refs.
Order from LC mi$3.00, ph$6.30 PB 142 089

The pressure derivative of the elastic stiffness constants of aluminum and magnesium have been measured using a modified ultrasonic pulse echo method.

Minnesota U., Minneapolis.
EFFECT OF CHANGING CYCLIC MODULUS ON BENDING FATIGUE STRENGTH, by A. A. Blatherwick and B. J. Lazan. Rept. for 1 Jan 56-1 Sep 58 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5449. May 59, 34p. 6 refs. WADC Technical rept. 56-127, Pt. 2; AD-214 385.
Order from OTS $1.00 PB 151 897

The influence of the observed increasing cyclic modulus in super-purity aluminum on stress distribution in bending-fatigue specimens is discussed. The resulting stress redistribution is examined for the various types of fatigue tests in common use. Differences in published fatigue data are partially explained in the light of this stress redistribution. It is concluded that for a cyclic strain hardening material, such as high purity aluminum, constant strain (or deflection) tests are more severe than constant moment tests, and the latter in turn are more severe than constant stress tests. Some observations of the development of slip bands and fatigue cracks are presented. (See also PB 121 816)

Rodman Lab., Watertown Arsenal, Mass.
DUCTILE HIGH STRENGTH TITANIUM CASTINGS BY INDUCTION MELTING, by John Zotos, Paul J. Ahearn and Harry M. Green. Sep 58 [19]p. 22 refs. Rept. no. RPL 10/13.
Order from OTS $0.50 PB 151 572

Titanium alloy scrap can be reprocessed by induction melting to produce castings with mechanical properties approaching the specification for forged titanium. The process is economical and the induction stirring of the melting furnace produces metal of uniform composition and temperature.

Nonferrous (except light) Metals

Brown U. Div. of Engineering, Providence, R. I.
EXPERIMENTAL SURVEY OF THE DEFORMATION OF A HARD-DUCTILE TWO-PHASE ALLOY SYSTEM, WC-Co, by C. Nishimatsu and J. Gurland. Technical rept. no. 2 on Contract Nonr-562(19). Sep 58, 37p. 11 refs. Nonr-562(19)/2.
Order from LC mi$3.00, ph$6.30 PB 142 094

The deformation of two-phase alloys of tungsten carbide and cobalt was studied by mechanical and metallographic methods. The deformation characteristics under tension, bending, and impact were related to the order of appearance and extent of plastic flow of matrix and fracture of the carbide particles.

New York U. Coll. of Engineering, N. Y.
VAPOR PRESSURE OF MAGNESIUM OVER ALPHA AND BETA SILVER-MAGNESIUM ALLOYS, by P. Herasymenko. Final rept. on Contract DA 30-069-ORD-1405. Apr 57, 29p. 7 refs. AD-128 392.
Order from LC mi$2.70, ph$4.80 PB 137 497

Abrupt changes in the curves of partial thermodynamic functions were observed at 16.6 and 25 atomic percent magnesium in the alpha field, and at about 40 and 50 atomic percent magnesium in the beta field. these changes are due to changes in ordering.

Structural Metallurgy and Corrosion

Brown U. Div. of Engineering, Providence, R. I.
PHENOMENOLOGICAL THEORIES OF TIME EFFECTS IN METALS AT HIGH TEMPERATURES WITH SPECIAL REFERENCE TO PRIMARY CREEP, by B. C. Hoskin. Technical rept. no. 7 on Contract Nonr-562(20). Sep 58, 31p. 21 refs. Nonr-526(20)/7.
Order from LC mi$3.00, ph$6.30 PB 142 075

Several of the laws that have been suggested as adequate for describing the mechanical behavior of a metal at high temperature are reviewed. Attention is confined to the case of constant ambient temperature and uniaxial stress systems. Most consideration is given to the question of a law describing the deformation associated with so-called primary creep.

Illinois U., Urbana.
SOLVENT ACTION OF VARIOUS BASE COAT GLASSES ON INGOT IRON AT OPERATIONAL TEMPERATURES, by M. P. Bauleke, W. J. Plankenhorn, and D. G. Bennett. Rept. no. 50 on Contract W33-038-ac-14520. Sep 50, declassified, 15p. 9 refs. AF Technical rept. 6093; ATI-90 103.
Order from LC mi$2.40, ph$3.30 PB 142 042

The solvent action was studied at operational temperatures which were below that necessary to produce coating fluidity. The more refractory glasses usually had less solvent action than those of lower softening range, at the same soaking temperatures.

Indiana Steel Products Co., Valparaiso.
A NEW APPROACH TO ANALYZING THE PHASES OF ALNICO V, by K. J. Kronenberg and R. K. Tenzer. Rept. on Contract AF 33(616)3385. Mar 59, 49p. 38 refs. WADC Technical rept. 58-536; AD-203 383.
Order from OTS $1.25 PB 151 882

The first section contains electron micrographs of the phase structure in Alnico V after complete industrial treatment. The step by step formation of this final shape of the two phases became visible on samples with different incomplete heat treatments. By iron oxide colloid patterns, we tested the magnetic effect of the phases in the final distribution and present a possible explanation of the magnetization reversal. A magnetic analysis of the composition of the two Alnico V phases is presented in Section II. Structure-independent properties, like saturation magnetization and temperature coefficient, serve to indicate the correctness of alloys supposed to represent these phases. A model of the two-phase structure of Alnico V is derived from

electron micrographs. The combined saturation magnetization and the combined temperature coefficients are calculated with this model using the measured properties of the single alloys. The two alloys whose combined properties come closest to those of Alnico V consist mainly of NiAl and Fe_2Co, respectively.

Metallurgical Research Labs., Syracuse U., N. Y.
INVESTIGATION OF THE EFFECTS OF STRESS CONCENTRATIONS AND THE CRACKING TENDENCY OF HEAT TREATED TITANIUM AND STEEL SHEET ALLOYS, by John G. Sessler. Quarterly progress rept. no. 1 on Contract NOas-58-855-c. Oct 58, 11p. 5 refs.
Order from LC mi$2.40, ph$3.30 PB 137 494

Room temperature tensile tests were performed on notched and smooth specimens taken from ahnealed Ti-6A1-4V sheet, aged Ti-6A1-4V and aged Ti-16V-2.5A1.

Michigan U. Coll. of Engineering, Ann Arbor.
SINTERING OF VANADIUM PENTOXIDE, by G. Parravano and V. J. Lee. Rept. on Contract AF 49(638)493. June 59, 10p. 4 refs. 2832-2-T; AFOSR-TN-59-481; AD-215 734.
Order from LC mi$1.80, ph$1.80 PB 142 357

Sintering of vanadium pentoxide microspheres has been studied in the temperature range of from 560 to 650°C in air and with spheres of diameters varying from 0.2 to 0.9 mm. Rate data have been interpreted in terms of a sintering mechanism involving migration of vacancies along the surface and grain boundaries of the spheres. The role of whisker growth on sintering is discussed. The overall sintering process is shown to be the result of several steps; the initial stage of the kinetic sequence is the growth of oxide whiskers.

Northwestern U., Evanston, Ill.
FURTHER STUDIES OF GPI ZONE FORMATION IN Al-2 at.% Cu, by C. Chiou, H. Herman and M. E. Fine. Rept. on Contract AF 18(600)1468. 2 June 59, 35p. 24 refs. AFOSR-TN-59-509; AD-216 274.
Order from LC mi$3.00, ph$6.30 PB 142 038

The effects were investigated of varying the solution treating procedure and the concentration of quenched-in vacancies on the growth kinetics of Guinier-Preston zones of the first kind (GPI). Dynamic Young's modulus was studied in single crystal specimens. The variables that were investigated for direct aging were solution temperature (515° and 550°C) and quenching speed (oil and water quenching). Data indicated that grain boundaries do not appear to have a significant effect on the kinetics of formation of zones occurring at room temperature. The magnitude of the change in Young's modulus varied with crystallographic direction. The hardness change during aging was not orientation dependent over the range that was studied. The initial rate of aging was slower after oil quenching, but this was reversed at later times. The rate of aging was greater for oil quenching at longer times. Final hardness was considerably less for the oil quench.

Pennsylvania State U., University Park.
RESEARCH AND DEVELOPMENT ON THEORETICAL AND EXPERIMENTAL STUDIES OF MECHANICAL PROPERTIES OF METALS SUBJECTED TO TRIAXIAL STRESSES, by L. W. Hu and Joseph Marin. Final rept: for 15 Sep 55-15 Sep 57 on Contract DA 36-061-ORD-505. 15 Oct 57. 97p. 5 refs.
Order from LC mi$5.40, ph$15.30 PB 140 949

Contents:
"Experimental and theoretical studies on the mechanical properties of metals under triaxial stresses", by L. W. Hu and J. Marin
Development of a triaxial stress testing machine and triaxial stress experiments, by L. W. Hu
Determination of the plastic stress-strain relations in tension for brass under hydrostatic pressure, by L. W. Hu
The effect of hydrostatic pressure on the shear strength of metals, by L. W. Hu
A note on the effect of pressurization on the fatigue life of metals, by L. W. Hu

Rock Island Arsenal Lab., Ill.
STRAINING AS RELATED TO SOFT FILM PETROLATUM BASE PRESERVATIVES USED FOR PRESERVATION OF ANTIFRICTION BEARINGS, by Linden H. Wagner. 18 Feb 59, 47p. 7 refs. Rept. no. 59-463; AD-210 921.
Order from LC mi$3.30, ph$7.80 PB 142 111

Stain production and inadequate protection resulting from preventives applied to antifriction bearings were studied utilizing formulated compositions consisting of petrolatum, wax, oils, and inhibitors of sodium and barium sulfonates. Bearings coated with the preventives were (1) openly exposed as controls, (2) wrapped in Grade A glassine laminate, Grade A polyethylene laminate, and aluminum foil. They were exposed to long term shed storage, high humidity, and dry environments. It was revealed that the stain test apparently is specific for a particular high humidity environment; however, stain can develop under other conditions which cannot be detected by the stain test, so that inhibitors or compounds currently evaluated as satisfactory, under an accelerated test procedure, may not perform in like manner in shed storage.

Watertown Arsenal Labs., Mass.
IMPACT PROPERTIES OF MEDIUM CARBON STEELS AS AFFECTED BY BORON, RARE EARTHS, AND SELECTED ALLOYING ELEMENTS, by R. E. Stiles and M. B. Pierson. June 59, 35p. 10 refs. Technical rept. no. WAL TR 325/1; AD-216 459.
Order from LC mi$3.00, ph$6.30 PB 142 426

Impact properties of 18 medium carbon steels, varied by rare-earth additions, boron additions, and alloy modifications. After a full martensitic quench, the steels were tempered in the range 400° through 1200°F, and tested at room temperature and -40°F. Medium carbon steels with decreased nickel contents offset by increased manganese contents and with carbon, chromium, and molybdenum contents constant were found to be equally tough. Rare-earth and boron additions had no significant effect on impact properties.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIOACTIVATION OF OXYGEN AND CARBON IN BERYLLIUM, by D. B. Beard, R. G. Johnson and W. G. Bradshaw. Rept. on Contract NOrd-17017. 20 Aug 58, 22p. 20 refs. LMSD-5065.
Order from LC mi$2.70, ph$4.80 PB 142 315

An activation technique is described for determining the presence of carbon and particularly oxygen contaminants in beryllium and some other metals and for identifying these impurities with a maximum sensitivity of several parts per million.

National Bureau of Standards, Washington, D. C.
CALCULATED BEHAVIOR OF A FAST NEUTRON SPECTROMETER BASED ON THE TOTAL ABSORPTION PRINCIPLE, by James E. Leiss. 14 Apr 59, 37p. 6 refs. Technical note no. 10.
Order from OTS $1.00 PB 151 369

Performance calculations for a total absorption fast neutron spectrometer are presented. The spectrometer detecting element is a boron-10-loaded liquid scintillator. By making the scintillator a thin disk, only those neutrons whose first collision is a large-energy-loss hydrogen collision have appreciable chance of remaining in the spectrometer long enough to be captured. The expected energy resolution and efficiency of this type of spectrometer are determined, and are comparable to other types of fast neutron spectrometers.

National Bureau of Standards, Washington, D. C.
A DOUBLE-PULSE TOTAL-ABSORPTION FAST NEUTRON SPECTROMETER, by L. J. Nicastro and R. S. Caswell. 24 Apr 59, 27p. 10 refs. Technical note no. 1.
Order from OTS $0.75 PB 151 360

A fast neutron spectrometer utilizing the double-pulse total-absorption technique has been developed for use in the energy range 1 - 20 Mev. The total absorption spectrometer uses a hydrogenous scintillator, in which a fast neutron may lose all its energy, together with a detector for slow neutrons. Scintillation detection of the disintegration caused by absorption of a slow neutron in an element of high reaction cross section serves to identify those neutrons which lost essentially all their energy in the hydrogenous scintillator. Various organic liquid scintillators loaded with natural methyl borate, and a plastic scintillator with a boron-10 or lithium-6 slow neutron scintillation detector nearby were all tested with monoenergetic neutrons obtained from the D(d, n) He^3 and T(d, n) He^4 reactions. The best experimental results were obtained with a plastic scintillator and a $Li^6I(Eu)$ crystal. Representative data for this spectrometer are given below. For comparison purposes, the results of Monte Carlo calculations, made by Leiss for a phenylcyclohexane liquid scintillator loaded with methyl borate (B^{10} enriched), are also included.

Naval Radiological Defense Lab., San Francisco, Calif.
SEQUENTIAL ANALYSIS OF TRACER AMOUNTS OF Np, U AND Pu IN FISSION-PRODUCT MIXTURES BY ANION EXCHANGE, by L. Wish and M. Rowell. 11 Oct 56, 30p. 19 refs. Research and Development Technical rept. USNRDL-TR-117.
Order from LC mi$2.70, ph$4.80 PB 142 173

Elution characteristics of Np, Pu, U, and Zr in HCl, HNO_3, and H_2SO_4 media with Dowex-2 anion resin were found. From these a procedure for the sequential analysis of the three actinides in fission-product mixtures in HCl and HNO_3 has been developed. Protactinium has also been included in the separation scheme. In most cases the Np, Pa and Pu were sufficiently decontaminated after one column for 99 per cent purity. The U contained a large portion of the Zr and had to be treated further for a satisfactory separation. The yields were approximately 70 to 90 per cent.

New Mexico U., Albuquerque.
ON THE RESPONSE OF A SINGLE LARGE SCINTILLATOR TO EXTENSIVE AIR SHOWERS, by John R. Green. Rept. on Contract AF 49(638)34. 4 May 59, 26p. 11 refs. AFOSR TN-59-490; AD-215 843.
Order from LC mi$2.70, ph$4.80 PB 142 021

Investigations of extensive air showers in the cosmic radiation have been largely characterized by widespread arrays of Geiger-Muller tubes arranged in trays or of scintillators. This paper is concerned with applying the known properties of extensive air showers to predict the response of such a scintillator.

Yale U., New Haven, Conn.
COMPENSATIONS IN ELECTRON EXCITATION EFFECTS IN p-p AND p-n SCATTERING, by M. de Wit, C. R. Fischer, and W. Zickendraht. Rept. on Contract AF 18(600)771. 5 May 59, 13p. 5 refs. AFOSR TN-59-486; AD-215 779.
Order from LC mi$2.40, ph$3.30 PB 142 158

In the present note an account is given of calculations for monopole, dipole and quadrupole Coulomb Excitation. These were carried out according to the same general plan as that used by Breit. For each of the three multipoles the effects of the different channels were combined and finally the incoherent contributions were added to the effects of the cross product terms on the coherent scattering.

Elementary Particles

Air Force Cambridge Research Center, Bedford, Mass.
FUNDAMENTAL PARTICLES, by Paul J. Nawrocki. Mar 59, 33p. 28 refs. AFCRC-TR-59-123; AD-212 072
Order from LC mi$3.00, ph$6.30 PB 142 350

A vast majority of mathematical disciplines pertinent to nuclear physics have explicitly or implicitly postulated an infinite universe of point particles. A

different interpretation of nucleons, beta decay, and mesons, consistent with Eddington's concept of a finite universe composed of only two species of "fundamental particles", is presented.

California U., Berkeley.
ANALYTICAL PROPERTIES OF TRANSITION AMPLITUDES IN PERTURBATION THEORY, by Stanley Mandelstam. Rept. on Contract AF 49(638)327. [1958] 38p. 10 refs. AFOSR TN-59-436; AD-214 798.
Order from LC mi$3.00, ph$6.30 PB 142 146

The analytic properties of two-particle transition amplitudes as functions of both energy and momentum transfer are examined in perturbation theory. The modified Nambu representation previously proposed by the author for expressing these properties is discussed in a little more detail. It is shown that, as long as the masses do not satisfy certain inequalities connected with the existence of anomalous thresholds, the fourth-order terms, calculated in the usual manner, satisfy the representation. The spectral functions are calculated explicitly for spinless particles. The proof can be extended to the sixth order, but is not worked out here. The modifications necessary when there exist anomalous thresholds are mentioned.

California U., Berkeley.
CONSTRUCTION OF THE PERTURBATION SERIES FOR TRANSITION AMPLITUDES FROM THEIR ANALYTICITY AND UNITARITY PROPERTIES, by Stanley Mandelstam, Rept. on Contract AF 49(638)327 [1958] 43p. 10 refs. AFOSR TN-59-437; AD-214 799.
Order from LC mi$3.30, ph$7.80 PB 142 145

The analyticity properties of transition amplitudes are used in conjunction with the unitarity requirements to generate successive terms in the perturbation series, without referring to a specific Lagrangian. In the sixth and higher orders, production is neglected in the unitarity condition; subject to this approximation, it is found that the series can be so constructed. No analyticity properties which have not been rigorously proved need be employed, and the terms are found to satisfy the double dispersion representation. By examining the connection between this method and the conventional calculation of the perturbation series the types of spectral function corresponding to different Feynman diagrams can be found. Formulae are given for the regions in which the spectral functions are non-zero.

California U., Berkeley.
INELASTIC FINAL-STATE INTERACTIONS: K^- ABSORPTION IN DEUTERIUM, by Robert Karplus and Leonard S. Rodberg. Rept. on Contract AF 49(638)327. 1959 53p. 18 refs. AFOSR TN-59-332; AD-213 653.
Order from LC mi$3.60, ph$9.30 PB 142 409

Ecole Normale Superieure (France).
ON THE DESCRIPTION OF UNSTABLE PARTICLES IN QUANTUM FIELD THEORY, by Maurice Levy. Technical note no. 13 on Contract AF 61(052)173. [1958] 37p. 18 refs. AFOSR TN-59-417; AD-214 564.
Order from LC mi$3.00, ph$6.30 PB 142 097

The mass and life-time of an unstable particle may be defined by the real and imaginary parts of a complex pole appearing on the Riemann surface in which its propagator can be continued analytically. This method, which was originally proposed by Peierls, is studied in detail, first on the basis of a special model, then in a more general field theory. The possibility of analytical continuation of the propagator is discussed, using the conditions of causality and unitarity of the S-matrix. The appearance of "unphysical" poles in the various sheets of the Riemann surface is also discussed. It is inferred that a physical principle must be used in each case, in order to select the particular pole which can be correctly interpreted as describing the properties of an unstable particle.

Institute of Mathematical Sciences, New York U., N. Y.
THE APPLICATION OF THE IMPULSE APPROXIMATION TO THE INELASTIC SCATTERING OF ELECTRONS BY HYDROGEN ATOMS, by Richard Akerib and Sidney Borowitz. Rept. on Contract AF 19(604)1705. July 58, 43p. 16 refs. Research rept. no. CX-34; AFCRC-TN-58-283.
Order from LC mi$3.30, ph$7.80 PB 137 481

A calculation of the ionization cross section and the excitation cross section to the 2S and 2P states of hydrogen by collision with electrons is carried through, using an impulse approximation. The results are then compared to the experimental results when available and to the various theoretical calculations. The cross sections obtained compare favorably with experiment except for the excitation to the 2S state. The calculations carried out by these methods are considerably simpler than the usual approximation methods, and the agreement of the results with experiment indicates that it is a simpler and better method to use for the computation of cross sections in the scattering of electrons by atoms.

Johns Hopkins U. [Baltimore, Md.]
THE USE OF S-MATRIX POLES IN THE DETERMINATION OF PARITIES, by G. Feldman and T. Fulton. Rept. on Contract AF 18(603)143. 11 May 59, 8p. 8 refs. AFOSR TN-59-421; AD-214 142.
Order from LC mi$1.80, ph$1.80 PB 142 155

Pennsylvania U., Philadelphia.
TOTAL PHOTON ABSORPTION IN C^{12} and O^{16}, by Milo M. Wolff. Technical rept. no. 4 on Contract Nonr-551(17). May 58, 73p. 54 refs.
Order from LC mi$4.50, ph$12.30 PB 139 454

Numerous investigations have been concerned with the problem of structure in the excitation functions of photonuclear reactions particularly in the region of the giant resonance -8 to 30 Mev. In this experiment, a direct absorption measurement has been done in which samples were interposed between a Sodium Iodide scintillation detector and the tritium target of a van de Graaff accelerator. The results of the experiment show that structure in the total gamma absorption of

C^{12} does not exist to the extent predicted by L. Katz and co-workers. They are not inconsistent with the broader structure previously found in (γ, p) reactions.

Purdue U. [Lafayette, Ind.]
ON THE EVALUATION OF DISPERSION RELATIONS, by R. Blankenbecler (Princeton U.) and S. Gartenhaus. Rept. on Contract AF 18(600)1579. [1959] 32p. 11 refs. AFOSR TN-59-534; AD-216 551.
Order from LC mi$3.00, ph$6.30 PB 142 403

A new evaluation of the dispersion relations for mesonic phenomena is proposed. The method, which utilizes the comparison function procedure, makes explicit use of crossing symmetry and allows for an exact treatment of nuclear recoils. For the case of meson nucleon scattering at low energies an expansion of a first order solution is made in inverse powers of the nucleon mass and agreement with the results of a previous evaluation is obtained. The extension of the method to other processes is briefly discussed.

Sarah Mellon Scaife Radiation Lab., U. of Pittsburgh, Pa.
THE DETERMINATION AND INTERPRETATION OF NUCLEAR RADII BY NEUTRON SHAPE ELASTIC SCATTERING, by Kamal Kishore Seth. Doctoral thesis. Technical rept. no. 8 on Precision Scattering of Nuclear Particles, Contract N7onr-32505. Aug 57, 159p. 81 refs. AD-140 581.
Order from LC mi$7.50, ph$24.30 PB 142 126

In this thesis it is proposed to examine the concept of a 'nuclear radius', to present results of investigations of nuclear radii made by accurate determinations of neutron shape elastic (or what is more commonly known as 'potential scattering') cross section, and to discuss the interpretation of such results in the light of other experiments which are employed to determine nuclear radii.

Stanford U., Calif.
NUCLEON CORRELATION EFFECTS IN HIGH-ENERGY ELECTRON SCATTERING, by W. E. Drummond. Technical rept. no. 33 on Contract AF 49(638)388. June 58, 39p. 10 refs. Rept. no. 545-33; AFOSR TN-58-1003; AD-206 146.
Order from LC mi$3.00, ph$6.30 PB 137 492

Using Schiff's high-energy approximation a sum rule is developed which relates the scattering of high-energy electrons from heavy nuclei to the two-particle correlation function for the nucleus. It is shown that correlations due to the Pauli principle give a large effect in the region of momentum transfer from 100 to 300 Mev/c, and that correlations with a range of less than one fermi do not make appreciable contribution.

Instruments and Installations

Convair, Fort Worth, Tex.
NEUTRON SPECTRUM MEASUREMENTS WITH RADIOACTIVANTS, by W. E. Dungan. Rept. on Contract AF 33(600)32054. 30 Dec 57, 83p. 16 refs. NARF-57-57T; MR-N-177.
Order from LC mi$4.80, ph$13.80 PB 142 108

This report describes the experimental methods and results of neutron spectrum measurements with radioactivants in the pneumatic tube of NARF - Ground Test Reactor for a wet-pool configuration. Measurements were made with foils and solution detectors. The results indicate that a three-group (Maxwellian, 1/E, and fast) specification of the neutron flux is sufficient for the GTR. Also given in this report is a semi-empirical method for estimation of the total thermal flux, total epithermal flux, and neutron energy distribution for configurations in which a boral shielding material is used.

National Bureau of Standards, Washington, D. C.
PENETRATION OF GAMMA RAYS FROM ISOTROPIC SOURCES THROUGH ALUMINUM AND CONCRETE, by Martin J. Berger and Lewis V. Spencer. 11 May 59, 14p. 7 refs. Technical note no. 11.
Order from OTS $0.50 PB 151 370

Semi-analytical expressions, with numerically specified parameters, are given which represent the gamma ray dose distribution in infinite aluminum or concrete media, for sources that are monoenergetic (with energies between 10.22 Mev and 0.0341 Mev), isotropic, and have the form of an infinite plane, point, disk or spherical surface.

Nepa Div., Fairchild Engine and Airplane Co., Oak Ridge, Tenn.
MULTIPLE CRYSTAL GAMMA-RAY SPECTROSCOPY USING NaI-Thl CRYSTALS, by Joe Keagy Bair, F. Maienschein, and William B. Baker. 13 Feb 51, 43p. 6 refs. NEPA-1701; AT1-174 190.
Order from LC mi$3.30, ph$7.80 PB 137 383

Instruments and techniques have been developed for a unique response gamma-ray spectrometer. With such instrumentation, a curve of intensity versus energy can be obtained with a one-to-one correspondence between gamma rays and peaks in the curve. These instruments utilize up to three sodium iodide-thallium iodide crystals in coincidence and/or anti-coincidence. Sensitivities and resolutions obtained are of practical value.

Nuclear Engineering and Power

Convair, Fort Worth, Tex.
REACTOR FUEL ELEMENT INSPECTION, by P. L. Marjon. Rept. on Contract AF 33(600)32054. 1 Oct 57. 59p. 10 refs. NARF-57-43T; MR-N-170.
Order from LC mi$3.60, ph$9.30 PB 142 117

Fuel elements from the Aircraft Shield Test Reactor and the Ground Test Reactor were inspected to determine physical condition and corrosion damage. Although several types of corrosion were in evidence, no fission product activity was detectable on the fuel

elements. Procedures were developed which included transportation, visual inspection, photography, corrosion sampling, and surface casting.

Materials Research Lab., Watertown Arsenal, Mass.
MATERIALS IN THE NUCLEAR AGE, by John J. Antal. Sep 58, 20p. 1 ref. MRL rept. no. 56; AD-201 520.
Order from LC mi$2.40, ph$3.30 PB 140 970

Gamma-ray absorption, neutron absorption values, structural components in the vicinity of a reactor core, materials for the absorption of neutrons in control rod applications, derangement of the crystallographic and electronic structure of the atoms of a solid through the continual bombardment by nuclear particles, analytical work regarding the detection of minute quantities of elements in materials, and determination of crystallographic structures.

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
DISCUSSION OF EXPERIMENTAL SHIELDING PROGRAM WITH DR. GOODMAN AT M. I. T., by M. L. Lesser and M. Gerson. 17 Sep 47, 8p. 6 refs. NEPA-352-EAM-513; AD-204 053.
Order from LC mi$1.80, ph$1.80 PB 137 340

Radioactivity

Convair, Forth Worth, Tex.
CALCULATED GAMMA RAY SPECTRA FROM U^{235} FISSION PRODUCTS, by John F. Scoles. Rept. on Contract AF 33(600)32054. 29 Aug 58. 151p. 11 refs. NARF-58-37T; FZK-9-132.
Order from LC mi$7.50, ph$24.30 PB 142 179

The gamma rays from fission products remaining in a reactor after operation are usually the most important contributors to the dose from a shutdown reactor or spent fuel assembly. To improve the accuracy of shielding calculations, the spectra of these gamma rays were calculated for various combinations of reactor operation time and time after shutdown. A literature survey was performed to obtain U^{235} thermal fission yields and decay information. These data were used in a digital computer program to obtain the gamma ray energy in each of 28 energy groups. The results obtained are substantially more accurate than previous calculations of the same type.

Naval Radiological Defense Lab., San Francisco, Calif.
RESIDUAL GAMMA RADIATION FIELDS FROM INDUCED SOIL ACTIVITIES, by R. L. Mather. 9 Apr 58, 25p. 8 refs. Research and Development Technical rept. USNRDL-TR-240.
Order from LC mi$2.70, ph$4.80 PB 142 174

The residual gamma radiation from neutron-induced activities in the soil around ground zero following a nuclear detonation is an important hazard in some situations. Two empirical profiles of activation vs depth in the soil are assumed and the characteristics of the direct gamma radiation field above the soil are computed. Scattered radiation is estimated to contribute about 86 percent as much hazard as the direct radiation but is not computed. The characteristics for the induced radiation field are contrasted with the characteristics of a fallout radiation field and marked differences are found in the angular distribution (more uniform), variation of total intensity with height (less), radius of the importantly contributing area (less, and the radiation protection afforded by a hole (much less).

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
ANTHROPOMETRIC SIZING AND FIT-TEST OF THE MC-1 ORAL-NASAL OXYGEN MASK, by Irvin Emanuel, Milton Alexander, and Edmund Churchill (Antioch Coll.). Rept. on Anthropometry and Equipment Sizing, Contracts AF 18(600)30 and AF 33(616)3841. Mar 59, 28p. 6 refs. WADC Technical rept. 58-505; AD-213 604.
Order from OTS $0.75 PB 151 880

A sizing program for oral-nasal oxygen masks, based on total face length and lip length, has been developed through a reanalysis of the 1950 USAF Anthropometric Survey head and face data. Face forms, based on this sizing program, have been constructed for use in the preparation of such masks. The MC-1 Oxygen Mask, an oral-nasal, pressure-demand type mask, has been fabricated in accordance with the sizing system and through the use of these face forms. In the fit-tests, 149 of 150 subjects fit-tested were satisfactorily fitted in their indicated sizes. This report includes a discussion of the theoretical and practical aspects of the sizing procedure. Design limits and related statistical material and suggested procurement tariffs, for each of the six sizes proposed are given. The MC-1 mask is described and the fit-test procedure and results are presented.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
A HEIGHT-WEIGHT SIZING SYSTEM FOR FLIGHT CLOTHING, by Irvin Emanuel, Edmund Churchill (Antioch Coll.) and others. Rept. on Personal Equipment Sizing, Contract AF 33(616)3841. Apr 59, 116p. 18 refs. WADC Technical rept. 56-365; AD-130 917.
Order from OTS $2.50 PB 151 858

The observations and recommendations reported here are based on a re-analysis of the body size data of the 1950 Anthropometric Survey of Air Force flying personnel. This re-analysis consisted of selecting pairs of dimensions and correlating these with other dimensions important in clothing design. Among the pairs studied, height and weight have been chosen as basic sizing dimensions because they generally yield the highest correlations with other bodily dimensions. In addition to presenting the methodology used in the

present problem, the practical and statistical problems of developing a sizing system are thoroughly discussed. Finally, tables of body dimensional data are presented for several basic size programs (6-size, 8-size, 9-size, and 12-size), since the number of sizes varies with the type of garment. These tables include fitting charts, estimated procurement tariffs, design ranges, mean values for size groups, and bivariate tables for height and weight with size categories marked off for each program. The choice and application of these programs are discussed in detail.

[Quartermaster Research and Engineering Center, Natick, Mass.]
MODEL AND SIZE DATA FOR THE DESIGN OF MEN'S CLOTHING, by Russell W. Newman. 18p. 4 refs. Environmental Protection Div. rept. no. 217.
Order from LC mi$2.40, ph$3.30 PB 142 138

This study presents average data on bodily dimensions of approximately 25,000 U. S. Army soldiers. This series is successively divided into subgroups on the basis of size (Chest Circumference), model (Drop or Chest Circumference minus Waist Circumference), and length (Stature). Mean values on size groups and models within size groups are presented in tabular and graphic form to facilitate interpretation. Length groups within the model's and sizes are given in tabular form only. The percentage of occurrence of the model groups, i.e., 25 percent of Slender (seven to ten inches of Drop), 62 percent Normal (four to seven inches of Drop), 10 percent Portly (1-1/2 to four inches of Drop), and 1 percent Stout (zero to 1-1/2 inches of Drop) indicates that a definite requirement exists for their use in men's service or semi-dress uniforms. The atypical groups, Slender and Portly, are found with almost equal frequency in all chest size groups. It is recommended that the data presented here be considered in any proposed major revision of the U. S. Army men's service uniform.

Quartermaster Research and Engineering Center, Natick, Mass.
THERMAL PROTECTIVE CHARACTERISTICS OF NEOPRENE-COATED FORTISAN (EXPERIMENTAL PROTECTIVE PONCHO MATERIAL), by Joseph E. Assaf. Apr 59, 32p. 10 refs. Technical rept. CP-13.
Order from LC mi$3.00, ph$6.30 PB 142 213

This report covers a comprehensive study to determine the thermal protective characteristics of an experimental coated fabric which is being considered for the fabrication of this poncho. The thermal protective properties of this new material were determined by exposure to a high energy source in the laboratory (Quartermaster Carbon Arc), and from actual field exposure to the thermal pulse of an atomic explosion (Operation Plumbbob). During Operation Plumbbob, the material was tested as a thermal shield. In the laboratory, it was evaluated in direct contact with uniform systems supported by animate (pig) and inanimate (transite) receivers.

AVCO Research Lab., Everett, Mass.
ONE DIMENSIONAL FLOW OF AN IONIZED GAS THROUGH A MAGNETIC FIELD, by R. M. Patrick and T. R. Brogan. Rept. on Contract AF 04(645)18. Oct 57, 53p. 7 refs. Research rept. 13; AD-159 527.
Order from LC mi$3.60, ph$9.30 PB 142 332

An ionized gas is composed of three species; electrons, ions, and neutral particles. To take complete account of all the phenomena occurring when the high velocity gas interacts with the magnetic field, the motion of all three species must be considered. When this is done, it is found that the electrical conductivity of the gas is a tensor dependent on both the magnitude and geometry of the magnetic field. However, when the collision frequency for the electrons is greater than their cyclotron frequency in a magnetic field, the gas may be considered a continuum with a scalar conductivity. When the gas state is adjusted to produce a scalar conductivity, all of the observed effects can be explained with a simple theory for two experimental geometries in which the gas current forms closed loops in the magnetic field. The interaction produces a flow completely analogous to pipe flow with friction and no heat transfer, where the wall friction force is replaced by the magnetic body force which chokes the flow and forces sonic speed at the exit of the field. Using the same experimental geometries, the gas state is then adjusted so that the electrical conductivity is a tensor. Outstanding among the observed effects are ion slip, where the ions and neutrals travel through the field at different velocities, and Hall currents, generated by the drift of the charged particles across magnetic field lines. The observed effects again agree with the predicted values.

Electricity and Magnetism

Geophysical Inst., U. of Alaska, College.
RAPID FLUCTUATIONS IN EARTH-CURRENTS AT COLLEGE, by V. P. Hessler and E. M. Wescott. Scientific rept. no. 1 on Contract AF 19(604)3075. Jan 59, 28p. 10 refs. AFCRC TN-59-275; AD-214 418.
Order from LC mi$2.70, ph$4.80 PB 142 027

An unusual type of earth-current variation is regularly observed in the College records. The phenomena consist of more or less regular fluctuations with range from a few mv/km to more than 1000 mv/km, and periods ranging upwards from 6 seconds. The fluctuations may continue from a few minutes to several hours. They have a strong diurnal variation at College with a broad maximum at 0600 local time. The fluctuations also occur at a site about 100 km southeast of College, but are not observed at Barrow. Thus these rapid fluctuations

display characteristics quite different from the previously classified magnetic and earth-current continuous pulsations, pc's, and train pulsations, pt's. Special equipment was devised to count and record the period of the fluctuations on a continuous basis. Typical rapid fluctuation traces and charts showing their activity patterns are presented.

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
THE ELECTRIC CONDUCTIVITY OF A PARTIALLY IONIZED GAS, by A. C. Pipkin. Rept. on Contract AF 49(638)401. Apr 59, 32p. 4 refs. AFOSR-TN-59-489; AD-215 842.
Order from LC mi$3.00, ph$6.30 PB 142 180

The transfer equations as deduced by Burgers are used to calculate the electrical conductivity of a partially ionized gas in the presence of a magnetic field.

Institute of Geophysics, U. of California, Los Angeles.
SOME MEASUREMENTS OF THE VARIATION OF ELECTRICAL SPACE CHARGE NEAR THE GROUND, by S. Ruttenberg, R. Dickinson and others. Scientific rept. no. 2 on Contract AF 19(122)254. 15 Mar 52, 14p. 10 refs.
Order from LC mi$2.40, ph$3.30 PB 142 280

A series of experiments is described in which simultaneous measurements of potential gradient and air conductivity are made at ground level and at a height of three meters. Additional measurements of the variation of the potential gradient with height were made. Application of Poisson's equation resulted in numerical values of the variation of the electrical volume charge density with height and with time near the surface. The magnitudes are compared with earlier experiments performed by a number of investigators in Europe. The results obtained in California present additional information which contributes to a better understanding of the dependence on local conditions. The comparison of the quantitative values of the corresponding time variations of field intensity, positive conductivity, air-earth current density, and volume charge density led to conclusions about the influence exerted by wind borne space charges. The importance of this factor in determining the suitability of a permanent station for atmospheric electrical measurements is indicated.

Wesleyan U. [Middletown, Conn.]
BIBLIOGRAPHY OF PIEZOELECTRICITY, by Karl S. Van Dyke and Jeanette C. Pascall. Rept. no. 10 on Piezoelectric Crystal Studies and Measurements, Contract DA 36-039-sc-42587. 6 June 55, 50p. 362 refs. AD-95 828.
Order from LC mi$3.30, ph$7.80 PB 142 123

Each citation has been checked to show following averages if any: general, ferroelectrics, resonators, transducers, ultrasonics.

Weston Observatory, Mass.
STUDY OF MIDDLE LATITUDE MAGNETIC ACTIVITY, by Daniel Linehan. Rept. on Contract AF 19(604)1927. Oct 58, 11p. AFCRC-TR-59-226; AD-212 266.
Order from LC mi$2.40, ph$3.30 PB 142 348

Willow Run Labs., U. of Michigan, Ann Arbor.
LECTURES ON SWITCHING AND AUTOMATA THEORY, by Calvin C. Elgot. Technical rept. on Contracts DA 20-081-ORD-16971 and Nonr-1224(21). Jan 59, 81p. 62 refs. 2755-3-T; AD-211 498.
Order from LC mi$4.80, ph$13.80 PB 142 253

Electronics

Institute of Mathematical Sciences, New York U., N. Y.
EXCITATION AND PROPAGATION OF SURFACE WAVES, by Joseph B. Keller and Frank C. Karal, Jr. Rept. on Contract AF 19(604)1717. Feb 59, 29p. 3 refs. Research rept. no. EM-128; AFCRC-TN-59-156; AD-212 464.
Order from LC mi$2.70, ph$4.80 PB 142 206

A geometrical theory is developed for the analysis of surface wave excitation and propagation. The surfaces along which the surface waves propagate may be either curved or flat, and may have either constant or variable properties. The theory is based on the concept of a complex or imaginary ray. The excitation coefficient which enters the theory is determined from the solution of a canonical problem - that of a line source over an impedance plane. Then the theory is applied to the surface wave excited by a line source, on a wedge with variable surface impedance. The result agrees precisely with the asymptotic form of the exact solution. Another application is made to the surface wave excited on a cylinder by a line source. The result also agrees with the exact solution.

Institute of Mathematical Sciences, New York U., N. Y.
SOME SPECTRAL PROPERTIES OF WEIGHTED RANDOM PROCESSES, by H. S. Shapiro and R. A. Silverman. Rept. on Contract AF 19(604)1717. Mar 59, 20p. 7 refs. Research rept. no. EM-125; AFCRC-TN-59-160; AD-212 927.
Order from LC mi$2.40, ph$3.30 PB 142 205

We study the power spectrum and, more generally, the spectral covariance of weighted stationary processes. It is found that if the power spectrum of the underlying stationary process is suitably well behaved and properly matched to the weight function, then the high-frequency behavior of the power spectrum and spectral covariance is especially simple. Asymptotic theorems describing this behavior precisely are given.

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
RELATIVE INTENSITIES OF MICROWAVE ABSORPTION LINES, by Peter H. Verdier and E. Bright Wilson, Jr. Rept. on Contract N5onr-1866, T.O. 14. [1958] 29p. 22 refs.
Order from LC mi$2.70, ph$4.80 PB 139 381

A method is described for measuring the relative intensities of microwave absorption lines up to 80 mc. apart to within a few percent, using a Stark-modulated resonant cavity absorption cell of novel design. Barriers to internal rotation in CH_3CHO and CH_3CH_2F have been obtained by measuring the relative intensities of torsional satellites. The resulting barrier heights are: 1103 ± 60 cal. for CH_3CHO, 3310 ± 210 cal. for CH_3CH_2F, in good agreement with the values 1162 ± 30 cal. for CH_3CHO and 3306 ± 100 cal. for CH_3CH_2F obtained from splitting measurements by Kilb, Lin and Wilson and by Herschbach, respectively. Correction factors are given for errors in intensity and splitting measurements due to small doublet splittings.

Naval Research Lab., Washington, D. C.
THE EFFECTS OF NUCLEAR IRRADIATION UPON THE MICROWAVE PROPERTIES OF CERTAIN FERRITES, by N. G. Sakiotis, E. I. Salkovitz, and A. I. Schindler. Interim rept. 19 June 59, 10p. NRL rept. 5321.
Order from OTS $0.50 PB 151 691

Results of the initial phases of a program to study the effects of high-energy neutron bombardment on the microwave properties of a wide variety of ferrite materials indicate that Faraday rotation and insertion loss can be changed by irradiation. It is also clear that these changes are not permanent but will vary with time. In the great majority of cases, the amount of Faraday rotation exhibited by the ferrite samples changed by a substantial amount immediately after irradiation but returned to the value observed before irradiation in at most 148 days. The effects of irradiation upon the losses of the ferrites are more complicated. Significant changes in the loss at high power levels have been observed 199 days after removal from the reactor in the case of magnesium-manganese ferrites and after 148 days in the case of nickel-manganese-copper and nickel-cobalt-aluminum samples. For the magnesium-manganese and nickel-cobalt-aluminate materials, it has been observed that the materials which were formed at a low firing temperature (1250°C) showed an increase in their high-power loss, which in most cases appears to be permanent. It has also been observed that a large substitution of aluminum for the iron in the nickel-cobalt ferrite can result in a large increase in rotation accompanied by large decreases in both low- and high-power losses when the material is subjected to neutron irradiation.

New York U., N. Y.
THE SCATTERING OF ELECTRONS BY FREE ELECTRONS, by A. Shadowitz, P. Nektaredes, and M. H. Shamos. Final rept. on Contract AF 18(600)950. 1 Jan 59, 86p. 10 refs. AFOSR-TR-59-72.
Order from LC mi$4.80, ph$18.30 PB 142 301

With multiple scattering the angular distribution is quite different from that found in single scattering and no satisfactory theory has yet been derived for their correlation. It was this lack of experimental findings which prompted the present investigation. In the first place, it is desirable to obtain additional verification of the theoretical predictions for the Coulomb collision of identical particles with spin. Secondly, such an experiment, involving only free fundamental particles, had not previously been performed and represents an interesting experimental technique. Finally, it was hoped that the method could be extended both to the very low and the very high energy regions, and to other fundamental particles as well.

Stanford Electronics Lab., Stanford U., Calif.
BASIC ELECTRONICS RESEARCH. Quarterly status rept. no. 16, 1 July-30 Sep 58, on Contract Nonr-225(24). [1958] 55p. 7 refs.
Order from LC mi$3.60, ph$9.30 PB 142 342

Contents:
Microwave tubes
Transistor research
Network studies
Control systems
Propagation

Molecular Physics and Spectroscopy

Emory U., Ga.
SIMPLE MOLECULAR ORBITAL THEORY OF CONJUGATION IN VINYL BROMIDE AND BROMOBENZENE, by John A. Howe (Ballistic Research Labs.) and J. H. Goldstein. Technical rept. no. 5 on Contract DA 01-009-ORD-440. 20 Dec 56, 19p. 20 refs.
Order from LC mi$2.40, ph$3.30 PB 137 496

Quadrupole coupling constants for vinyl bromide, supplemented by other data of spectroscopic origin, have been utilized to obtain a value for the resonance integral $\beta_{c\beta r}$, in simple molecular orbital theory with inclusion of overlap. Using this parameter, resonance dipole moments were calculated for vinyl bromide and bromobenzene, in reasonalbe agreement with experiment. Assumptions and approximations involved in the method are reviewed, and the properties of carbon-halogen bonds are discussed in the light of the results of this and similar previous studies.

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
INITIAL PERMEABILITY SPECTRA IN FERRITES AND GARNETS, by J. E. Pippin and C. L. Hogan. Scientific rept. no. 1 on Contract AF 19(604)1084. 1 Apr 59, 85p. 59 refs. AFCRC-TN-59-169; AD-214 412.
Order from LC mi$4.80, ph$13.80 PB 142 202

Measurements of initial permeability in the frequency range 5 Mc/s to 10,000 on nickel ferrites with five different densities; nickel-zinc ferrites; nickel-cobalt ferrites; nickel ferrite-aluminates; a magnesium-manganese ferrite; and magnetic garnets. The spectrum for high-density nickel ferrite shows evidence of two dispersion regions and two associated loss peaks.

Liège U. (Belgium).
AN ATLAS OF NITROUS OXIDE, METHANE AND OZONE INFRARED ABSORPTION BANDS. PART I, THE PHOTOMETRIC RECORDS, by M. Migeotte, L. Neven and others. Final technical rept., Phase B (Part 1), on Contract AF 61(514)432. 1957, 77p. 8 refs.
Order from LC mi$4.50, ph$12.30 PB 142 422

Contents:
Nitrous oxide and methane bands from 2.8 to 8.9 microns
Ozone bands from 3.2 to 10.2 microns

Liège U. (Belgium).
AN ATLAS OF NITROUS OXIDE, METHANE AND OZONE INFRARED ABSORPTION BANDS. PART II. MEASURES AND IDENTIFICATIONS, by M. Migeotte, L. Neven and others. Final technical rept., Phase B (Part 2) on Contract AF 61(514)432. 1958, 38p. 10 refs.
Order from LC mi$3.00, ph$6.30 PB 142 423

Contents:
Nitrous oxide and methane bands from 2.8 to 8.9 microns
Ozone bands from 3.2 to 10.2 microns (See also PB 142 422)

Liège U. (Belgium).
THE SOLAR SPECTRUM FROM 2.8 to 23.7 MICRONS. PART I. PHOTOMETRIC ATLAS, by M. Migeotte, L. Neven, and J. Swensson. Final technical rept., Phase A (Part 1) on Contract AF 61(514)432. 1956, 140p. 14 refs.
Order from LC mi$6.90, ph$21.30 PB 142 420

Liège U. (Belgium).
THE SOLAR SPECTRUM FROM 2.8 TO 23.7 MICRONS. PART II. MEASURES AND IDENTIFICATIONS, by M. Migeotte, L. Neven and others. Final technical rept., Phase A (Part 2) on Contract AF 61(514)432. 1957, 160p.
Order from LC mi$7.50, ph$24.30 PB 142 421

Wave lengths and wave numbers are given in Table A for the 3624 telluric and solar lines indicated in our Photometric Atlas of the solar spectrum from 2.8 to 23.7 microns. This table also contains the identifications of 90% of these lines. It is preceded by a discussion of the identifications according to the absorbing molecules and atoms. (See also PB 142 420)

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
INTERNAL BARRIER OF PROPYLENE OXIDE FROM THE MICROWAVE SPECTRUM. II, by Dudley R. Herschbach and Jerome D. Swalen (National Research Council of Canada). Rept. on Contract N5ori-1866, T. O. 14 [1958] 57p. 34 refs.
Order from LC mi$3.60, ph$9.30 PB 139 380

Several long progressions of perpendicular transitions occur in the microwave spectrum of propylene oxide. These have provided an opportunity to test the theory of internal rotation over a very large range of rotational quantum numbers, J = 1 to 48 and K = 1 to 25, in the ground torsional state.

Oregon U., Eugene.
PRESSURE EFFECTS OF HELIUM AND ARGON ON THE FIRST SHARP SERIES DOUBLET OF INDIUM, by Shang-Yi Ch'en and Allen Smith. Interim technical rept. on Modification of the Shape and Positions of Spectral Lines by Foreign Gases under Well-Defined Conditions of High Pressure and High Temperature, Contract DA 04-200-ORD-713. Feb 59, 34p. 8 refs. AD-211 330.
Order from LC mi$3.00, ph$6.30 PB 142 071

The shift, broadening, and asymmetry of the Inλ4511 and λ4101 lines produced by various pressures of helium and argon up to 120 atmospheres and the appearance of satellite bands near these lines are described. The f-values (.072), transition probabilities (4.36×10^8 and 3.96×10^8), and the optical collision diameters (8.3 Å and 7.9 Å) for these two lines were determined. The wings of the pressure broadened lines were studied and the broadening and shift are explained in terms of Anderson and Talman's equation.

Purdue U., Lafayette, Ind.
INFRARED SPECTRA OF METAL NITRATES, by Frederick Vratny. Rept. on Contract AF 18(603)45. Aug 58, 22p. 8 refs. AFOSR TN-58-868; AD-203 667.
Order from LC mi$2.70, ph$4.80 PB 137 469

The spectra of 35 metal nitrates has been presented. A tabulation of observed frequencies has been made, and an interpretation of the spectra made on the basis of varying symmetry types. A correlation is made between a decrease in the magnitude of the ν_1 frequency of the D_{3h} symmetric nitrate ion and the increase in the covalent bonding character.

St. Louis U., Mo.
COLLISION BROADENING IN THE MICROWAVE SPECTRA OF SYMMETRIC TOP MOLECULES, by Lee J. Kieffer, James G. Broerman, and A. V. Bushkovitch. Rept. on Collision Diameters in Microwave Pressure Broadening, Contract AF 18(600)1590. 1 May 59, 22p. 8 refs. AFOSR-TR-59-29; AD-212 702.
Order from LC mi$2.70, ph$4.80 PB 142 160

The collision cross sections for dipole-dipole, dipole-quadrupole, and quadrupole-quadrupole interactions were calculated in this paper. Unfortunately line breadth data for non-inversion symmetric top spectra are insufficient for comparison with experiment.

Optics

Army Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.
A HUMAN ENGINEERING EVALUATION OF

SPOTTING ROUNDS WITH RESPECT TO FIRE DIRECTION CAPABILITIES, by Charles Fried and Lois F. Ivey. June 59, 37p. Technical memo. 4-59.
Order from LC mi$3.00, ph$6.30 PB 142 010

Twelve (12) enlisted men of the 82nd Airborne Division, Fort Bragg, North Carolina were used as subjects in an exploratory experiment conducted at Aberdeen Proving Ground, Maryland to evaluate spotting rounds with respect to fire direction capabilities.

Chicago Midway Labs., U. of Chicago, Ill.
ATMOSPHERIC TRANSMISSION IN THE INFRARED DURING SEVERE WEATHER CONDITIONS, by S. W. Kurnick, R. N. Zitter, and D. B. Williams. Final rept. on Research Concerning IR Atmospheric Transmission under Haze Conditions, Contract AF 19(604)3909. May 59, 32p. 15 refs. CML-TN-P145-3.
Order from LC mi$3.00, ph$6.30 PB 142 072

Infrared transmission for wavelengths from 1.7 to 12.0 has been measured for a variety of weather conditions. The results show that fogs are increasingly transparent at the longer wavelengths. Precipitations such as rain, snow, sleet, and hail show no spectral effects even when the visibility is extremely curtailed. A quantitative analysis of the fog transmission data has been made under the assumption that natural aerosols follow the size distribution law: $N(r) = C r^{-t}$, where N(r) dr is the number of particles of radius r per cm^3, C is some constant, and t has a value between three and four. The wavelength dependence of optical absorption predicted by the theory agrees with the fog transmission data, and values of the parameter t as inferred from data plots are correlated in meaningful fashion with humidity and visibility conditions.

Wayne State U., Detroit, Mich.
THEORETICAL INVESTIGATIONS ON THE LIGHT SCATTERING OF COLLOIDAL SPHERES. VI. BACKWARD SCATTERING, by Masayuki Nakagaki and Wilfried Heller. Technical rept. no. 31 on Contract [Nonr]736(00). 20 Aug 58, 17p. 6 refs.
Order from LC mi$2.40, ph$3.30 PB 140 945

Light scattering of non-absorbing colloidal spheres in the direction towards the incident primary beam (backward direction) is investigated on the basis of the Mie theory. The parameters considered are: $\alpha = 0.2(0.2)15.2$ and $m = 1.20$. The data obtained are compared with those derived from the Rayleigh-Gans-Debye equation. A simple equation is derived by means of which the α-values of maximal and minimal scattering values can be calculated in satisfactory approximation. Data in the "extreme dissymmetry"--i_o/i_{180}--are given. (See also PB 140 904)

Solid State Physics

Aeronautical Research Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
AN ISOTHERMAL TRANSFORMATION STUDY OF THE BETA PHASE DECOMPOSITION IN A HYPO-EUTECTOID COPPER-INDIUM ALLOY, by James A. Street. Rept. on Solid State Research and Properties of Matter. Feb 59, 65p. 19 refs. WADC Technical rept. 59-58; AD-209 534.
Order from OTS $1.75 PB 151 865

The copper-indium alloy containing 69.30 wt-% copper and 30.65 wt-% indium has many structures which are similar to those found in the hypo-eutectoid iron-carbon alloy. Upon isothermally transforming this alloy above the eutectoid temperature, the pro-eutectoid α phase precipitates out from the parent β phase in a manner analogous to the precipitation of α iron from γ-iron in the iron-carbon system. Below the eutectoid temperature the α phase separates out in a number of different patterns. The number of precipitation sites for the α phase tends to increase as the transformation temperature is lowered.

Antioch Coll., Yellow Springs, Ohio.
PHYSICAL CHEMISTRY OF SILICA TRANSFER AND / OR DIFFUSION IN HYDROTHERMAL CRYSTAL GROWTH, by G. E. Owen, J. F. Corwin and others. Final rept. and Suppl. for 15 Mar-14 June 53 on Quartz Research Project, Contract DA 36-039-sc-15508. [1958] 25p. 4 refs.
Order from LC mi$2.70, ph$4.80 PB 142 225

Conditions for quartz growth in phosphate solutions under isothermal conditions at 400°C show that below pH 6.2-6.5 the crystals formed in devitrification are cristobalite, above 6.5 pH quartz is formed, at higher pH devitrification of silica glass takes place but little or no growth on a seed plate and at high pH the seed dissolves. Results of X-ray analysis of substances from autoclaves in attempts made to grow quartz in solutions of compounds of the alkaline earth metals: Magnesium and barium compounds have a tendency to form complex minerals (sepiolite, gillespite) and only calcium compounds show any tendency to form crystalline silica, with cristobalite the favored crystal form.

Army Signal Research and Development Lab., Fort Monmouth, N. J.
CHARACTERISTIC ENERGY LOSSES IN POTASSIUM CHLORIDE FILMS, by J. R. Anderson, I. N. Greenberg and Harold Jacobs. 15 Aug 58, 22p. 18 refs. USASRDL Technical rept. 1984.
Order from LC mi$2.70, ph$4.80 PB 142 209

Characteristic energy losses in evaporated potassium chloride films have been investigated by means of low-energy electron bombardment. The transmission of electrons to the platinum backing, and the back-scattering of electrons were measured. The results obtained correlate with x-ray and optical absorption studies, and indicate the similarity of effects in bulk material and films.

Brown U. Div. of Applied Mathematics, Providence, R. I.
THICKNESS EFFECTS IN BIREFRINGENT COATINGS WITH RADIAL SYMMETRY, by T. C. Lee, C. Mylonas, and J. Duffy. Technical rept. no. 1 on Contract DA 19-020-509-ORD-4674. Apr 59, 34p. 6 refs.

DA-4674/1.
Order from LC mi$3.00, ph$6.30 PB 142 069

An experiment is described in which the surface strains produced by the impact of a bullet on a flat plate are determined from the birefringence of a surface coating taking into account the effects of strain gradients and curvature. The values of surface strain are compared with measurements made by means of a square grid inscribed on the metal surface. A procedure is suggested for determining an unknown surface strain having radial symmetry from the total birefringence of the surface coating.

Columbia U., New York.
TWINNING IN ZINC SINGLE CRYSTALS, by Herbert D. Guberman. Rept. on Contract AF 18(600)898. 31 Aug 58, 30p. 9 refs. AFOSR TN-59-269; AD-212 703.
Order from LC mi$2.70, ph$4.80 PB 142 023

Resolved shear stresses for the nucleation of twins in the range 892 gr/mm^2 to 2317 gr/mm^2 have been found for clean surfaced zinc single crystals. For coated crystals the resolved shear stresses lay in the range 982 gr/mm^2 to 2568 gr/mm^2.

Cornell U., Ithaca, N. Y.
PRECISE WAVELENGTH OF A WIDE SPECTRAL LINE AND PRECISE LATTICE PARAMETER OF A CRYSTAL, by J. O. Porteus and L. G. Parratt. Technical rept. no. 3 on Contract AF 49(638)402. 1 May 59, 18p. 12 refs. AFOSR TN-59-305; AD-213 089.
Order from LC mi$2.40, ph$3.30 PB 142 003

In precision determinations of crystal lattice parameters, crystallographers recently pointed out that certain advantages accrue if the centroid of the diffraction pattern and of the x-ray line are used as reference angle (or wavelength) positions. Certain disadvantages are also pointed out: (1) the lattice parameter so determined refers necessarily to the centroid of the crystal pattern, (2) in order to keep the Bragg law simple and to avoid double-valued lattice parameters, the centroid proposal implies that x-ray wave-lengths in general should refer to the centroid of the respective lines, and (3) there is an inherent experimental imprecision in the determination of the centroid of any line or pattern having long tails that fade gradually into the ubiquitous background. The third point is argued qualitatively in terms of the general signal-to-noise ratio. This inherent imprecision is largely avoided if the peak position of the line is used as the reference position (defined as the intersection of the line profile with the curve drawn through the bisecting points of the horizontal chords of the line) and if the parameter position of the crystal pattern is taken as the bisector of the chord. These reference positions also avoid the Bragg law complication.

Denver Research Inst., Colo.
RESEARCH ON THE RECRYSTALLIZATION OF ALUMINUM SINGLE CRYSTALS, by H. P. Leighly, Jr., Robert A. McCune, and Frank C. Perkins. Rept. for 15 Mar 57-15 Oct 58 on Solid State Research and Properties of Matter, Contract AF 33(616)5151. Dec 58, 91p. 18 refs. DRI rept. no. 1019; WADC Technical rept. 58-634; AD-212 562.
Order from OTS $2.25 PB 151 862

The purpose of this project was to determine the rate at which a deformed, high-purity aluminum single crystal would recrystallize. Results of previous work on lower purity material disagreed as to whether the rate was linear or decreasing. In this work, it was found that the rate was linear for a considerable period of time but then gradually decreased. During these experiments, polygonization occurred simultaneously and competitively, and amount of polygonization determined whether recrystallization was hindered or inhibited.

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
STUDIES ON BASE NICKELS FOR OXIDE COATED CATHODES, by W. G. Shepherd. Scientific rept. no. 1, 15 Apr-15 July 58, on Contract AF 19(604)3890. [1958] 103p. 20 refs. AFCRC-TN-58-567; AD-160 879.
Order from LC mi$5.70, ph$16.80 PB 139 219

Re-evaluation of the method of carbonate preparation and deposition on the base metal, a study of the effects of surface preparation of the base, and an evaluation of binder constituents and concentrations. Experiments aim at the controlled chemical activation of an oxide cathode based on pure Ni. The cathode to be activated is exposed to the evaporation products from a cathode based on an active (0.2% Mg-Ni) alloy.

Evans Research and Development Corp. [New York].
DETERMINATION OF SURFACE FREE ENERGY OF METALS AND POLYMERS, by James Haygood, Robert Ullman, and Seymour Z. Lewin. Rept. on Surface and Interface Phenomena of Matter, Contract AF 33(616)3567. Apr 59, 87p. 12 refs. WADC Technical rept. 59-147; AD-211 923.
Order from OTS $2.25 PB 151 929

A new method for the determination of the surface free energy of solids has been developed. The method is based on Williamson's suggestion for the determination of the residual force after correcting for bulk forces in creep experiments (WADC TN 57-199). This correction for bulk forces is made by running two samples of different surface to volume ratios against one another differentially. Although reasonable values have been obtained for the surface tensions of aluminum, nylon, and gold, many unreasonable results have also been obtained. These reflect variations in the surface condition and composition of the samples tested. This has led to the definition of a new term, the "apparent surface tension", which includes all effects not calculable from sample geometry.

Honeywell Research Center, Hopkins, Minn.
EFFECT OF SURFACE CONDITION ON THE INITIATION OF PLASTIC FLOW IN MAGNESIUM OXIDE, by R. J. Stokes, T. L. Johnston, and C. H. Li. Technical rept. no. 3 on Contract Nonr-2456(00). Sep 58, 34p. 8 refs. HR-58-451.
Order from LC mi$3.00, ph$6.30 PB 142 345

Dislocation half-loops, artificially introduced by sprinkling with carborundum, were subjected to

stress using three-point loading. It is concluded that lattice resistance takes the form of a viscous drag rather than a static type of force.

Illinois U., Urbana.
EXPERIMENTAL RESEARCH ON PLASTIC DEFORMATION. Final rept. for 1 Sep 54-1 Sep 58 on Contract N6ori-071(54). 30 Sep 58, 4p. 11 refs.
Order from LC mi$1.80, ph$1.80 PB 142 316

By an X-ray method the dislocation density in aluminum single crystals is about $4 \times 10^6 \pm 3 \times 10^{-6}$ lines per cm^2 whether the crystal is grown from the melt or by strain annealing. Tensile tests on aluminum from 4.2°K to 20°C show that deformation at low temperatures produces only fine slip. At higher temperatures (20°C) most of the slip occurs in slip bands. Measurements on the temperature dependence of the internal friction of pure copper single crystals and of alloy crystals of copper with very small known amounts of gold were reported.

Illinois U., Urbana.
FINAL REPORT, by Robert J. Maurer. Rept. on Contract N6ori-071(29). Sep 58, 5p.
Order from LC mi$1.80, ph$1.80 PB 142 323

Investigations of the ionic conductivity and self diffusion coefficients of ions in the alkali halides, study of the self diffusion of the silver ion in silver chloride and silve bromide, determination of the Hall mobility of electrons in insulating crystals, concerning color centers in alkali halide crystals, spin resonance in alkali halide crystals, and evidence for the existence and migration of excitons in these crystals.

Illinois U., Urbana.
THE INFLUENCE OF ELASTIC ANISOTROPY ON THE DISLOCATION CONTRIBUTION TO THE ELASTIC CONSTANTS, by G. deWit and J. S. Koehler. Technical rept. no. 5 on Contract N6ori-071(54). May 58, 21p. 20 refs.
Order from LC mi$2.70, ph$4.80 PB 139 463

It has been known for some time that the internal friction and the elastic constants of elastically anisotropic crystals even when measured at very low strain amplitudes are rather sensitive to the dislocation density. This paper attempts to calculate the dislocation contribution to the elastic constants and it attempts to describe how the dislocation and the perfect crystal contributions to the elastic constants can be obtained experimentally. The calculations are given in a form suitable for the face centered cubic metals, but the basic concepts can be applied to any crystal.

Institute of Engineering Research, U. of California, Berkeley.
THEORY OF THE STAGNATION POINT LANGMUIR PROBE, by L. Talbot. Technical rept. on Contract AF 49(638)502. 30 Mar 59, 33p. 11 refs. HE-150-168; Series no. 132, issue no. 1; AFOSR-TN-59-474; AD-215 717.
Order from LC mi$3.00, ph$6.30 PB 142 263

The purpose of this report is to develop the theory of the stagnation point Langmuir probe, and to show how measurements made with such a probe can be used to determine free stream ion concentrations and temperatures in a supersonic plasma jet stream.

Istituto Elettrotecnico Nazionale "Galileo Ferraris" (Italy).
THERMOLUMINESCENCE AND F-CENTERS, by Guido Bonfiglioli, Piero Brovetto and Cesare Cortese. Final rept. on Study of the Traps Distribution in Dielectrics or Semiconductors by Thermoluminescence Experiments, Contract AF 61(514)1333. Sep 58, 32p. 6 refs. AFOSR TR-58-134; AD-204 428.
Order from LC mi$3.00, ph$6.30 PB 137 477

Louvain U. (Belgium).
STUDIES ON THE MECHANISM OF ELECTROLUMINESCENCE, by A. Luyckx, J. Vandewauwer, and S. Ries. Annual technical rept. for 15 Nov 56-15 Nov 57 on Contract [61] (514)1118. [1957] 44p. 4 refs. AFOSR TN-58-[153]; AD-152 [179].
Order from LC mi$3.30, ph$7.80 PB 142 162

The present research is the first systematic work about electrical and dielectrical measurements concerning E. L. powders. Dielectric loss, resistivity and capacity were studied in function of A. C. voltage applied at the industrial frequency of 50 Hz; analogous measurements were made with phosphorescent powders and compared to E. L.

Materials Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
OBSERVATIONS ON THE EFFECT OF SURFACE AND STRUCTURE ON THE TENSILE STRENGTH OF IRON WHISKERS, by Helmut Weik. Rept. for July-Sep 58 on Non-Chemical Systems and Methods of Synthesis Research. May 59, 28p. 39 refs. WADC Technical note 58-369; AD-212 151.
Order from OTS $0.75 PB 151 904

Investigations were made of iron whiskers grown by reduction of iron chloride. On the surface of some whiskers shearing of surface layers could be observed giving the impression that the whisker surface has a layer or shell structure. By means of microstructure investigations the layers observed in the surface were also discovered in the whisker core. The distance between the layers was found to be constant and about 1200 to 1500 atoms thick. Nickel coating of the whiskers increased the tensile strength. In the case of a 100 atoms thick nickel coating the amount of increase was about 100% compared with the strength value of the uncoated whisker. That means that surface effects are important in considering the reasons for the extremely high tensile strength of very thin whiskers.

Materials Research Lab., Watertown Arsenal, Mass.
ELECTRON DISTRIBUTION IN TRANSITION METALS, by A. J. Freeman and R. J. Weiss. Apr 59, 6p. 4 refs. MRL rept. no. 62; AD-215 532.
Order from LC mi$1.80, ph$1.80 PB 142 079

A new calculation on a model which exaggerates the effect of charge asphericity and which is also mathematically simple to treat is reported. Only a marked change in the radial charge density can be responsible for the large reduction in the scattering factor of α Fe at the 110 peak.

Metals Research Lab., Brown U., Providence, R. I.
INFLUENCE OF BOUNDARY ORIENTATION ON GROWTH RATES IN RECRYSTALLIZATION, by H. Yoshida, N. Pitula and B. Liebmann. Technical note on Contracts AF 49(638)479 and Nonr-562(12) 30 Apr 59, 12p. 7 refs. AFOSR TN-59-382; AD-214 009.
Order from LC mi$2.40, ph$3.30 PB 140 995

Thin rods of 1.5mm x 1.5mm cross section were cut from strained aluminum single crystal sheets and artificially nucleated at one end. Growth rates and preferred orientations after recrystallization were investigated for various boundary orientations.

Metals Research Lab., Brown U., Providence, R. I.
INVESTIGATION OF RECRYSTALLIZATION IN ALUMINUM SINGLE CRYSTALS, by B. Liebmann and K. Lücke. Final rept. on Contract AF 49(638)75. 1 Sep 58, 10p. 7 refs. AFOSR TR-58-124; AD-202 925.
Order from LC mi$1.80, ph$1.80 PB 137 476

Experiments on orientation of recrystallized grains and their rate of growth in strained aluminum single crystals. Differences in the results of two earlier studies have been traced to the influence of the state of impurities. Small amounts of iron in solution suppress preferred orientations while this effect does not exist when the iron is precipitated.

Metals Research Lab., Brown U., Providence, R. I.
INVESTIGATIONS ON RECRYSTALLIZATION AND RECOVERY OF STRAINED ALUMINUM SINGLE CRYSTALS, by Robert Green, Jr., Hidehiko Yoshida, and Bernhard Liebmann. Technical note on Contract AF 49(638)479. 30 Apr 59. 79p. 25 refs. AFOSR TN-59-381; AD-214 008.
Order from LC mi$4.50, ph$12.30 PB 140 996

The influence of the state of impurities (dissolved in solid solution or precipitated) on the recrystallization of extended aluminum single crystal wires was investigated, especially with regard to the generation of preferred orientations, growth rates of new crystals during recrystallization, and recovery of the growth rates. The crystals contained 99.79% aluminum, 0.09% iron, 0.09% silicon and 0.03% zinc.

Metals Research Lab., Brown U., Providence, R. I.
RECRYSTALLIZATION, by Bernhard G. Liebmann. Status rept. on Contract AF 49(638)479. 15 Apr 59, 6p. 1 ref. AFOSR-TR-59-63; AD-217 009.
Order from LC mi$1.80, ph$1.80 PB 142 302

Influence of Thermal History on Preferred Orientations in the Recrystallization of Technically Pure Aluminum by R. E. Green, Jr., B. G. Liebmann, and H. Yoshida Technical Note AFOSR TN 58-1014.

Investigations on Recrystallization and Recovery of Strained Aluminum Single Crystals by R. E. Green, Jr., H. Yoshida and B. G. Liebmann Technical Note AFOSR TN 59-381.

Influence of Boundary Orientation on Growth Rates in Recrystallization by H. Yoshida, N. Pitula and B. Liebmann Technical Note AFOSR TN 59-382.

Metals Research Lab., Brown U., Providence, R. I.
SUMMARY OF THE INFLUENCE OF DEFINED IMPURITIES ON THE RECRYSTALLIZATION OF ALUMINUM, by J. Gurland and K. Lücke. Final rept. on Contract AF 18(600)1495. 1 Aug 58, 6p. 4 refs. AFOSR TR-58-120; AD-202 352.
Order from LC mi$1.80, ph$1.80 PB 137 475

The influence of small additions (less than 0.14%) of Cu, Mg, Si, Mn, Ag, Ni, Zn and Fe upon the recrystallization of high purity Aluminum (99.998%) was investigated by X-ray diffraction methods.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE DIELECTRIC CONSTANT OF LIQUIDS, by A. Isihara. Rept. on Contract AF 19(604)4143. 26 Feb 59, 20p. 8 refs. Research rept. R-713-59; PIB-641; AFCRC-TN-59-163; AD-213 098.
Order from LC mi$2.40, ph$3.30 PB 142 271

The so called rotational fluctuation effect which causes the deviation from Clausius-Mosotti equation for the dielectric constant of non polar liquids is considered. The effect is important in the case of anisotropic molecules. By applying the mathematical method which has been developed by the author and others in relation to the calculation of the second virial coefficients of rigid molecules, it is found that the rotational fluctuation is split into two, one representing the geometrical anisotropy and the other the optical anisotropy.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
HIGH POWER MEASURING TECHNIQUES, by Max Sucher. Final rept. on Contract AF 30(602)1686. 9 Mar 59, 56p. 3 refs. Rept. R-718-59; PIB-646; RADC-TR-59-51; AD-213 480.
Order from LC mi$3.60, ph$9.30 PB 142 141

During the course of this contract, effort was mainly devoted to the analysis, design, construction, and testing of a broadband high-power monitoring device of the feed-through (non-terminating) type. Basically, this device consists of an array of equally spaced squarelaw probing elements along the axis of propagation of a section of transmission line which can be inserted between generator and load. The summed output of all the elements is a measure (not always exact) of the power delivered to the termination. It is shown that, for a mismatched load, the power monitoring error is minimized over a given frequency band if the

elements are spaced a quarter wavelength apart at midband frequency and respond to the square of the line voltage with individual proportionality (or weighting) factors that are derivable from an appropriate Tschebyscheff polynomial. An S-band five-element bolometer probe device was built for an approximately 2:1 band and its behavior was checked at a number of frequencies for two different values of load reflection coefficient as the phase angle of the latter ranged through 2π radians. The results were in good agreement with theory. Also covered in this work was the investigation of the use of ferromagnetic films and evaporated indium antimonide for the monitoring of high power through the Hall effect. (See also PB 137 005)

Northwestern U., Evanston, Ill.
OPTICAL AND ELECTRICAL PROPERTIES OF CUPROUS OXIDE, by Frank L. Weichman. Doctoral thesis. Supplement to final rept. on the Excitation of Short Infrared Pulses With High Repetition Rate by Electron Bombardment of Cuprous Oxide. Contract Nonr-1228(04). Aug 58, 138p. 146 refs.
Order from LC mi$6.90, ph$21.30 PB 140 973

An experimental study of the conductivity, optical absorption, photoconductivity, and phosphorescence of pure cuprous oxide.

Palermo U. (Italy).
CRYSTAL PLASTICITY, by D. A. Aboav. Final rept. on Contract AF 61(514)1078. Jan 59, 28p. 34 refs. AFOSR TR-59-27; AD-212 257.
Order from LC mi$2.70, ph$4.80 PB 142 098

A theory of plastic properties of metal crystals is concerned mainly with plastic deformation, such as laminar glide in hexagonal crystals. The theory is applied to metal hardness and fatigue.

Pennsylvania State U., University Park.
GRAPHICAL ANALYSIS OF THE FORMATION OF SHOCK FRONT AND SCABBING IN MATERIALS, by Shoi-Yean Hwang and Norman Davids. Interim technical rept. no. 17 on Theoretical Analysis of Scabbing in Materials, Contract DA 36-061-ORD-465. 15 Feb 59, 33p. 6 refs. AD-213 898.
Order from LC mi$3.00, ph$6.30 PB 142 232

The application of the contour method to non-linear materials with a two-straight-line stress-strain relation such as rubber-like, foam plastic, is given. The formation of shock wave and its behavior on the X-T diagram is presented. The multiple scabbing phenomenon of materials due to tensile reflection from a free boundary is analyzed and presented graphically. General rules governing the structure of the X-T diagram are delineated.

Sloane Physics Lab., Yale U., New Haven, Conn.
MULTIPLET STRUCTURE OF EXCITONS IN CdS, by R. G. Wheeler. Rept. on Contract AF 49(638)503. May 59, 9p. 10 refs. AFOSR-TN-59-526; AD-216 260.
Order from LC mi$1.80, ph$1.80 PB 142 266

This note is to report on the line absorption spectra near the absorption edge of CdS single crystals at 4.2°K and its possible interpretation.

University Coll., Cork (Eire).
THE HYPERCIRCLE METHOD APPLIED TO THE SOLUTION OF THE BIHARMONIC EQUATION. II, by V. G. Hart. Technical note no. 7 on Contract AF 61(514)1163. Dec 58, 23p. 3 refs. AFOSR TN-59-296; AD-213 040.
Order from LC mi$2.70, ph$4.80 PB 142 019

The approximate solution of the biharmonic equation is considered in a plane multiply connected region. The boundary conditions correspond to the problem of a perforated elastic plate clamped at both interior and exterior boundaries and subjected to transverse loading. The method used is that of the hypercircle and it provides upper and lower bounds on a functional (the strain-energy) involving the solution of the biharmonic boundary-value problem. Pointwise bounds are not considered here, but can be obtained by use of a suitable Green's function. Estimates of the deflection of the plate and bending moments in it are also given.

Western Electric Co., Laureldale, Pa.
INDUSTRIAL PREPAREDNESS STUDY: DIFFUSED SEMICONDUCTOR DEVICE 12, by E. A. Temple and W. F. Bennett. Quarterly progress rept. no. 1, 15 Sep 57-15 Dec 58, on Contract DA 36-039-sc-72729. [1958] 51p.
Order from LC mi$3.60, ph$9.30 PB 139 436

Production of germanium transistors: Header fabrication, gaseous diffusion, evaporation and alloying, control of spacing between stripes, wafer bonding to header, bonding wire leads to stripes, testing and electrical evaluation.

Utah U., Salt Lake City.
ELECTRIC MICROSTRUCTURE OF CORUNDUM, by H. B. Vanfleet, G. S. Baker, and P. Gibbs. Technical rept. no. 10 on Contract Nonr-1288(03). 15 Sep 58, 4p. 2 refs.
Order from LC mi$1.80, ph$1.80 PB 142 344

A furnace has been constructed which permits microscopic observation of a 1μ diameter probe, up to about 700°C, as it is manipulated over the surface of corundum crystals. Conduction current passing between the probe and a metallic coating on the under side of the crystal was measured. W, Pt, Cu, and Al probes and evaporated Ag, Co, or painted and fired "Platinum Bright" coatings were used.

Theoretical Physics

Cornell U., Ithaca, N. Y.
LINE ASYMMETRY AND SATELLITES IN X-RAY SPECTRA: EXCITATION STATES, by M. H. Skolnick

and L. G. Parratt. Technical rept. no. 5 on Contract AF 49(638)402. 20 May 59, 52p. 14 refs. AFOSR TN-59-505; AD-215 930.
Order from LC mi$3.60 ph$9.30 PB 142 181

Calculations are presented for the K spectra of solid metallic manganese. This many-electron model is able to explain satisfactorily the observed asymmetries of the Kα1, 2 lines and the origin of the Kβ' satellite lines for elements in the first transition group.

Cornell U., Ithaca, N. Y.
PROBABILITY FOR AN INNER TWO-ELECTRON TRANSITION: X-RAY Kβ' SATELLITE, by Masao Sawada, Takeshi Watanabe, and L. G. Parratt. Technical rept. no. 4 on Contract AF 49(638)402. 14 May 59, 17p. 8 refs. AFOSR TN-59-459; AD-215 264.
Order from LC mi$2.40, ph$3.30 PB 142 156

An explanation was recently proposed by Parratt for the rather intense radiation observed on the low-energy side of each of many x-ray emission lines. This explanation, in terms of excitation states, is based on a fundamental departure from the conventional type of x-ray energy level diagram. In some important cases the emission in question, e.g., the so-called Kβ' lines of the elements of the first transition group, had previously been interpreted by Sawada as a two-electron transition type of x-ray satellite. This interpretation was based on wavelength positions, and in regard to intensity it was purely qualitative. Because of the fundamental nature of the excitation state proposal, the theoretical relative intensity of the two-electron-jump type of satellite is explored in the present paper; it is found to be too low. Accordingly, this model for at least the bulk of the Kβ' line is untenable.

Lawrence Radiation Lab., U. of California, Berkeley.
IN-OUT FORMALISM FOR NONRELATIVISTIC QUANTUM MECHANICS, by Peter J. Redmond and Jack L. Uretsky. Rept. on [Contract DA 04-200-ORD-17111]. [1959] 31p. 6 refs. AD-212 532.
Order from LC mi$3.00, ph$6.30 PB 142 103

Nonrelativistic quantum mechanics with 2-body interactions are discussed using the in-out operator formalisms. The second quantized form of nonrelativistic quantum mechanics is outlined. This problem is formulated to provide a convenient starting point for the subsequent analysis. The conditions necessary to insure that the field operators in the theory possess asymptotic forms are determined. Appropriate definitions of the in and out operators are then given. The limiting processes envolved in defining the asymptotic operators cannot be uniformly convergent because of the invariance of the theory in under time translations. As a result, caution should be exercised in the order of taking limits. Suitable methods are found for finding the commutation relations of the in and out operators. The definition and evaluation of the S-matrix is considered. In the appendix, the properties of nonrelativistic wave packets are discussed.

Padova U. (Italy).
REPORT ON THE RECENT EINSTEIN UNIFIED THEORY, by Vaclav Hlavaty. Rept. on Contracts [N6onr-180(05) and DA 33-008-ORD-467]. Dec 54, 18p. 16 refs. AD-106 761.
Order from LC mi$2.40, ph$3.30 PB 142 285

Thermodynamics

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON INERTIA EFFECTS IN A TRANSIENT THERMO-ELASTIC PROBLEM, by Eli Sternberg and J. G. Chakravorty. Technical rept. no. 2 on Contract Nonr-562(25). May 58, 25p. 14 refs. 562(25)/2.
Order from LC mi$2.70, ph$4.80 PB 139 456

This paper is concerned with the dynamic treatment of the transient thermoelastic problem for a semi-infinite medium which is constrained against transverse displacements and is exposed to a uniform time-dependent heating (or cooling) of its entire plane boundary. The stress distribution appropriate to this problem, in the event that the surface temperature is a step-function of time, was previously established by Danilovskaya and by Mura. In the present investigation the accompanying displacements are determined in closed form.

California U., Berkeley.
ABSOLUTE SPECTRAL REFLECTIVITY OF CERTAIN PIGMENTS AND METALS IN THE WAVELENGTH RANGE BETWEEN 2 AND 15 MICRONS, by J. T. Gier, L. Possner and others. Rept. no. 7 on Thermal Radiation Project, Contract N7onr-295(01). 18 Feb 49, 28p. 2 refs. ATI-59 635.
Order from LC mi$2.70, ph$4.80 PB 142 254

Data on absolute spectral reflectivity as a function of wavelengths between the spectral region of 2 and 15 microns are presented; the collection of these data was made possible through the use of a "Black Body" Reflectometer (designed by the members of the staff of this project) used in conjunction the Perkin-Elmer infrared recording spectrometer. The results reveal important points of consideration for one who is engaged in choosing materials for infrared work; some of these points are discussed.

California U., Berkeley.
LOW TEMPERATURE EMISSIVITY MEASUREMENTS, by N. W. Snyder, J. T. Gier and others. Rept. no. 4 on Thermal Radiation Project, Contract N70nr-295(01). 1 July 48, 40p. 3 refs. ATI-90 576.
Order from LC mi$3.00, ph$6.30 PB 142 256

The results of techniques developed and used to determine the mean effective emissivity of different surfaces over a range of temperatures from 150°F to 700°F are presented. The measurement of radiant energy from the surfaces is accomplished by means of a 160 junction silver-constantan directional thermopile radiometer.

Convair, Pomona, Calif.
THERMAL STRESSES IN A SQUARE PLATE WITH A CENTRAL CIRCULAR HOLE SUBJECTED TO AN ARBITRARY TEMPERATURE GRADIENT, by R. D. Sutherland and F. M. White, Jr. Rept. on Contract AF 49(638)235. Feb 59, 35p. 8 refs. TM-349-2, AFOSR TR-59-11; AD-209 850.
Order from LC mi$3.00, ph$6.30 PB 139 663

An analysis of the thermal stress problem in a thin square plate containing a single concentric circular perforation is presented for an arbitrary temperature distribution. The results of the analysis are applied to a plate subjected to a simple doubly-symmetrical temperature distribution. The hoop stresses are calculated around the perimeter of the perforation and are presented as functions of angular displacement for four different inside radii.

Delaware U., Newark.
LOCAL HEAT FLUX IN A VERTICAL DUCT WITH FREE CONVECTION IN OPPOSITION TO FORCED FLOW, by S. A. Guerrieri and Russell J. Hanna. Final rept. on Contract Nonr-622(01). 31 Dec 52, 95p. 20 refs. AD-36 824.
Order from LC mi$5.40, ph$15.30 PB 142 260

Heat transfer rates accompanying simultaneous natural convection and forced flow of air in a vertical channel, using an optical method, were studied experimentally, under conditions such that the two types of flow tended to oppose each other. Thus the light, heated air tended to flow upward near the vertical surfaces of the channel while the air stream as a whole was forced to flow downward. These conditions are qualitatively similar to those occurring in cooling passages inside blades of gas turbines.

Experiment, Inc., Richmond, Va.
IGNITION AND FLAME PROPAGATION IN DUST CLOUDS, by Lloyd E. Line, Jr. Final technical rept. on Contract AF 18(600)1508. 31 Jan 58, 38p. 11 refs. EXP 205; TP-131; AFOSR-TR-58-94; AD-162 144.
Order from LC mi$3.00, ph$6.30 PB 137 471

The ignition of lycopodium, magnesium, carbon, and boron dust clouds has been studied under controlled conditions at 1 atmosphere. Both fuse-wire and spark ignition were employed. The ignition of dust clouds by means of very fast sparks is erratic and relatively difficult. For lycopodium the minimum gap energy and minimum oxygen concentration for ignition vary with the series resistance in the spark circuit. A mechanism is offered to account for the effect of discharge time on the minimum energy or oxygen concentration for ignition. Plots of flame radius (r) versus time (t) and dr/dt versus time and photographs of the spherical flame zone at selected time intervals are given.

Heat Transfer Lab., Mass. Inst. of Tech., Cambridge.
TRANSIENT RESPONSE OF DOUBLE-FLUID HEAT EXCHANGERS, by Vedat S. Arpaci, John J. Redlien, and John A. Clark. Rept. on Contract 33(616)3197. Oct 58, 98p. 6 refs. WADC Technical rept. 57-482; AD-210 251.
Order from OTS $2.25 PB 151 905

The dynamic response of two-fluid heat exchangers to a time dependent temperature at the inlet of the primary fluid has been experimentally investigated. A water-water system was used for three different flow rates. Data for both parallel and counter flows were obtained. The output response of the counterflow heat exchanger has been correlated by a method taken from a recent paper by London et al.

Institute of Flight Structures, Columbia U., New York.
ENERGY METHODS FOR THE ANALYSIS OF TEMPERATURE DISTRIBUTIONS AND THERMAL STRESSES IN STRUCTURES, by G. Herrmann. Technical note no. 2 on Contract AF 49(638)430. May 59, 15p. 6 refs. Rept. CU-4-59-AF-430-CE; AFOSR TN-59-327; AD-213 675.
Order from LC mi$2.40, ph$3.30 PB 140 994

Some well-known energy theorems of structural analysis are generalized for the case when a part of the stresses is due to thermal effects. These methods assume that the temperature distribution is known. It is shown further that the temperature distribution in the structure itself may be determined by the use of analogus energy theorems, which can be established for both steady-state and transient conditions.

National Bureau of Standards, Washington, D. C.
THERMODYNAMIC PROPERTIES OF HELIUM AT LOW TEMPERATURES AND HIGH PRESSURES, by Douglas B. Mann (Master's thesis) and R. B. Stewart. May 59, 40p. 15 refs. Technical note no. 8.
Order from OTS $1.25 PB 151 367

This thesis is a compilation and correlation of the present data on the thermodynamic properties of helium below 20°K. The existing data were compared to the new data and the errors resolved by selection based on estimated accuracy, experimental apparatus, and technique of the investigator. Methods of property diagram construction are also explained, and the results are presented in the form of temperature-entropy and enthalpy-entropy diagrams. Pressures to 100 atmospheres, temperatures from 0°K to 20°K and specific volumes from 5 liters/kgm. to 800 liters/kgm are presented.

National Bureau of Standards, Washington, D. C.
THE VAPOR PRESSURES OF SOME HYDROCARBONS IN THE LIQUID AND SOLID STATE AT LOW TEMPERATURES, by W. T. Ziegler. May 59, 19p. 12 refs. Technical note no. 4, formerly NBS Rept. 6038.
Order from OTS $0.75 PB 151 363

This paper presents a brief review of the literature pertaining to the vapor pressure of eleven hydrocarbons at low temperatures. These hydrocarbons are methane, ethane, propane, n-butane, isobutane (2-methyl propane), n-pentane, ethylene, propylene, 1-butene, acetylene and cyclopropane. All of these except cyclopropane are encountered in the purification of hydrogen from refinery sources. Vapor pressure

data are given for most of these hydrocarbons over the pressure range 0.001 to 1500 mm Hg. These data have been used to estimate the triple-point pressures of the hydrocarbons where these pressures were not found in the literature. Some data for the vapor pressures of solid methane, ethane, n-butane, ethylene, acetylene and cyclopropane are included.

Nepa Div. [Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.]
SUMMARY OF INVESTIGATION TO DATE OF METHODS OF MEASURING EXCESSIVELY HIGH TEMPERATURES, by Hal W. Maynor. 27 Aug 48, 20p. 21 refs. NEPA-746-IS-7; AD-204 000.
Order from LC mi$2.40, ph$3.30 PB 137 343

Stanford U., Calif.
AN EXPERIMENTAL INVESTIGATION OF THE BLOWDOWN PROCESS IN A SINGLE GAS RECEIVER, INCLUDING THE EFFECTS OF HEAT TRANSFER, by W. C. Reynolds, J. W. Millard, and W. M. Kays. Technical rept. no. T-2 on Contract [N6onr-251(06)]. 1 Dec 56, 40p. 3 refs. AD-117 488.
Order from LC mi$3.00, ph$6.30 PB 142 124

In this report experimental data for the blowdown process in a single air receiver is presented and discussed in detail. The data indicate that the analyses presented in an earlier report are useful for design purposes and give reasonable performance predictions for blowdown systems where heat transfer from and through the receiver walls is important. The data and analyses indicate that heat transfer may be neglected only for extremely rapid blowdown processes, and must definitely be considered in the design of most technical systems involving blowdown.

Technical Operations, Inc. [Arlington, Mass.]
TEMPERATURE RISE IN A SLAP SUBJECTED TO A RECTANGULAR HEAT PULSE WHEN RERADIATION IS CONSIDERED, by R. Greenstone. Rept. on Contract DA 29-044-XZ-467. 1 May 57, 10p. 4 refs. Rept. no. TOW 57-1; AFSWP-1042.
Order from LC mi$1.80, ph$1.80 PB 142 006

Wave Propagation

Air Force Cambridge Research Center, Bedford, Mass.
CHARACTERISTICS OF CONTINUOUS VHF IONOSPHERIC SCATTER PROPAGATION OF CONCERN IN THE DESIGN OF RELIABLE LONG-DISTANCE COMMUNICATIONS CIRCUITS, by Thomas F. Rogers. Mar 59, 68p. 98 refs. AFCRC-TR-59-122; AD-211 932.
Order from LC mi$3.90, ph$10.80 PB 142 195

The characteristics of VHF radiowave ionospheric scatter are studied in detail with emphasis on long term frequency, distance and temporal variations. The role of the antenna in making quantitative path loss estimations is of particular concern. Application of this propagation mode to long distance point-to-point communications is also studied.

Air Force Missile Development Center, Holloman AFB, N. Mex.
ON WAVE PROPAGATION IN THE ATMOSPHERE AND SATELLITE OBSERVATION ERRORS, by Herbert Knothe. May 59, 16p. 2 refs. AFMDC TN-59-9; AD-215 466.
Order from LC mi$2.40, ph$3.30 PB 142 187

Presented is a simple method, which does not even require a desk calculator, for calculating wave propagation through the atmosphere, and which produces an explicit expression for the evaluation of the errors of satellite observations.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
INVESTIGATION OF SUPERSONIC DISTURBANCES IN GLASS, by George E. Hauver, May 59, 17p. 3 refs. Memo. rept no. 1204.
Order from LC mi$2.40, ph$3.30 PB 142 011

Explosively induced supersonic disturbances in glass and plastic, recently reported and currently the subject of an OOR contract, have been further investigated since their existence contradicts established classical theory. The results of this investigation indicate that the supersonic disturbances are actually photographic ghost patterns which result from a characteristic of the light source used in the original investigation.

Brown U. Div. of Engineering, Providence, R. I.
RADIATION FIELD OF A POINT SOURCE IN A DUCT, by E. T. Kornhauser. Scientific rept. no. 1 on Contract AF 19(604)4561. Jan 59, 22p. 4 refs. AF-4561/1; AFCRC TN-59-135; AD-210 713.
Order from LC mi$2.70, ph$4.80 PB 142 363

The Green's function for the scalar wave equation in a stratified medium in which the propagation constant $K = k_o (1-a^2Z^2)^{1/2}$, which is a case of duct propagation, is rigorously obtained in terms of a modal expansion. Various approximate forms of this expression are derived, and comparison is made with the qualitative results predicted by ray theory. In particular it is shown that the Green's function reduced to the form $\epsilon^{ikr}/4\pi r$ at short range and to the field of a parallel plate waveguide at long range. At very high frequencies the lower order modes add in phase at the points where ray theory predicts focusing. Finally the solution for a line source is also briefly examined.

Cruft Lab., Harvard U., Cambridge, Mass.
HIGH FREQUENCY DIFFRACTION OF PLANE WAVES BY AN INFINITE SLIT, by S. R. Seshadri. Scientific rept. no. 20 on Contract AF 19(604)786. 31 Oct 58, 60p. 6 refs. AFCRC TN-59-125; AD-210 084.
Order from LC mi$3.60, ph$9.30 PB 142 385

The scattering of plane electromagnetic waves of wave number k by an infinite slit of width 2a formed by two perfectly conducting semi-infinite coplanar screens of zero thickness is considered. For the case when the direction of the incident electromagnetic wave is in a plane perpendicular to that of the screens and when the slit is oriented such that its edges are parallel to the incident magnetic vector the asymptotic series for the transmission cross section per unit length of the slit is determined up to the order $(ka)^{-4}$. The diffraction pattern in the far field and the currents on the two screens are also evaluated. The generalization of the method for the treatment of the case when the direction of the incident electromagnetic wave is not restricted to be in a plane perpendicular to that of the screens is also worked out. Extensive tables of the transmission coefficients per length of the infinite slit are included.

Cruft Lab., Harvard U., Cambridge, Mass.
HIGH FREQUENCY DIFFRACTION OF PLANE WAVES BY AN INFINITE SLIT FOR GRAZING INCIDENCE, by S. R. Seshadri and Tai Tsun Wu. Scientific rept. no. 23 on Contract AF 19(604)786. 31 Oct 58, 16p. 2 refs. AFCRC-TN-59-126; AD-210 085.
Order from LC mi$2.40, ph$3.30 PB 142 387

The scattering of plane electromagnetic waves of wave number k by an infinite slit of width 2a formed by two perfectly conducting coplanar screens of zero thickness is considered. In the limit of large ka and at grazing incidence, the asymptotic series for the transmission cross section per unit length of the slit is evaluated up to the order $(ka)^{-1\,1/2}$.

Cruft Lab., Harvard U., Cambridge, Mass.
AN INTEGRAL EQUATION FOR THE POTENTIAL AT THE GAP OF A SLOTTED CYLINDER, by M. S. Macrakis. Scientific rept. no. 19 on Contract AF 19(604)786. 15 Oct 58, 16p. 7 refs. AFCRC TN-59-128; AD-210 216.
Order from LC mi$2.40, ph$3.30 PB 142 386

An integral equation for the gap potential $\Psi(a, \phi')$ is derived and solved for the problem of the slotted cylinder in a static electric field.

Electrical Engineering Research Lab., U. of Illinois, Urbana.
SOME BASIC PROBLEMS IN THE DETERMINATION OF THE DIRECTION OF ARRIVAL OF RADIO WAVES, by Edger Clay Hayden. Doctoral thesis. Technical rept. no. 11 on Contract Nonr-1834(02). Sep 58, 172p. 22 refs.
Order from LC mi$8.10, ph$30.30 PB 140 993

It would be of value to have a more thorough knowledge of the characteristics of the individual signal components. The principle purpose of this investigation was the experimental evaluation of some of these characteristics for signals traveling in an east to west direction between particular fixed transmitting and receiving sites separated by 450 km. Of particular interest were the directional characteristics of signal components propagated in the various modes. By the employment of a special double-pulse transmitted signal, and receiving equipment capable of measuring and displaying simultaneously bearing, polarization, and mode structure, it proved possible to "take apart" a multicomponent arriving signal and study the behavior of its components. The frequency used was 5155 kc.

Institute of Mathematical Sciences, New York U., N. Y.
BASIC MATHEMATICAL INVESTIGATIONS IN ELECTROMAGNETIC WAVE THEORY, by Sidney Borowitz and Werner Gerbes. Final rept. on Contract AF 19(604)1717, continuation of Contract AF 19(122)42. Mar 59, 26p. 3 refs. AFCRC-TR-59-144; AD-215 113.
Order from LC mi$2.70, ph$4.80 PB 142 331

References are presented of the following problems in electromagnetic wave theory: (1) diffraction theory including diffraction problems involving short wavelength radiation, unidirectional conducting screens, diffraction by absorbers, multiple scatterings, and an equivalence relation between certain 2 and 3 dimensional geometries; (2) surface wave phenomena; (3) statistical problems including scattering by refractive index fluctuations, and coherence theory of optics; and (4) mathematical results.

Institute of Mathematical Sciences, New York U., N. Y.
BOUNDARY LAYER PROBLEMS IN DIFFRACTION THEORY, by Robert N. Buchal and Joseph B. Keller. Rept. on Contract AF 19(604)5238. Apr 59, 49p. 7 refs. Research rept. no. EM-131; AFCRC-TN-59-177; AD-214 569.
Order from LC mi$3.30, ph$7.80 PB 142 329

The description of wave propagation by means of geometrical optics is an asymptotic description valid for small values of the wavelength λ. This description fails at caustics, where it yields infinite field values, and at shadow boundaries, where it yields discontinuous values. The neighborhoods of caustics and shadow boundaries are interpreted as boundary layers and different expansions for the field in these layers are determined. These boundary layer expansions are finite at the caustics and continuous at the shadow boundaries. The formation of a caustic by a prescribed converging wave in 2 dimensions is discussed. In this case, the method yields the asymptotic expansion, for large $k = 2\pi/\lambda$, of the exact solution of the problem. Diffraction of a plane wave by an aperture in a thin screen is also discussed. Boundary layers occur around the edge of the aperture and in other places. A number of terms in the symptotic expansion of the field are determined, and a method is devised which can be used to find any number of additional terms. The results verify and extend previous analyses of this problem.

Institute of Mathematical Sciences, New York U., N. Y.
HIGHER ORDER APPROXIMATIONS IN MULTIPLE SCATTERING. I. TWO-DIMENSIONAL SCALAR CASE. II. THREE-DIMENSIONAL SCALAR CASE, by Norman Zitron and Samuel N. Karp. Rept. on Contract AF 19(604)1717. Mar 59, 43p. 14 refs. Research rept.

no. EM-126; AFCRC-TN-59-138; AD-211 521.
Order from LC mi$3.30, ph$7.80 PB 142 208

A formula is derived which expresses the perturbed scattering amplitudes of a combination of two arbitrary cylinders as a function of the unperturbed scattering amplitudes of the individual cylinders. The formula is valid when the spacing of the scatterers is large compared to their dimensions. It involves derivatives of the scattering amplitudes with respect to the angles of incidence and of observation. Interaction terms of degrees $d^{-1/2}, d^{-1}$, and $d^{-3/2}$ are taken into account, where d is the spacing. Verification is obtained in a special case. The result is employed to calculate the total scattering cross section. The method is extended to cover the three dimensional scalar problem for two bodies of arbitrary shape. All interaction terms of order d^{-1} and d^{-2} are given.

Metals Research Lab., Brown U., Providence, R. I.
MULTIPLE SCATTERING OF ELASTIC WAVES INVOLVING MODE CONVERSION, by Bertram Raphael and Rhon Truell. Technical note on Contract AF 49(638)450. 15 May 59, 58p. 7 refs. AFOSR TN-59-399; AD-214 519.
Order from LC mi$3.60, ph$9.30 PB 142 001

The equations of multiple scattering derived by Waterman and Truell [Technical rept. WAL 143/14-49, Oct 57] are applied to problems of scattering of elastic waves by a random array of identical spherical obstacles with mode conversion treated explicity. In the multiple scattering of a plane compressional wave, mode conversion is shown to introduce only negligible corrections to the modified phase velocity and attenuation expressions found by Waterman and Truell. In the multiple scattering of a plane shear wave, it is shown that no single overall modified phase velocity or attenuation exists since the wave motion in the scattering medium does not maintain the form of a plane wave. The incident plane shear wave after scattering is found to be resolved into a series of component waves; which are difficult to describe physically, and each of which propagates with its own independent phase velocity and attenuation. Formulas for the propagation parameters of each scattered component wave are developed in terms of constants which may be found from appropriate single-scattering problems, and these constants are evaluated for the case in which the scatterers are elastic spheres.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DIFFRACTION OF SURFACE WAVES BY DIELECTRIC DISC, by E. Arbel. Rept. on Contract AF 19(604)4143. 6 May 59, 153p. 5 refs. Scientific rept. no. R-734-59; PIB-662; AFCRC-TN-59-350; AD-216 235.
Order from LC mi$7.50, ph$24.30 PB 142 412

The properties of the dielectric disc as a radial surface wave guide and a radiator of electromagnetic enerby are investigated.

National Bureau of Standards, Washington, D. C.
AN ANALYSIS OF PROPAGATION MEASUREMENTS MADE AT 418 MC WELL BEYOND THE RADIO HORIZON, by H. B. Janes, J. C. Stround and M. T. Decker. May 59, 85p. 3 refs. Technical note no. 6.
Order from OTS $2.25 PB 151 365

This report presents the results of an analysis of transmission loss measurements made at 418 Mc over the 134-mile path from Cedar Rapids, Iowa to Quincy, Illinois during 1952 and 1953. The data consisted chiefly of continuous simultaneous recordings of signal level at several receiving antenna heights, ranging from 30 to 665 feet above ground. These data are reduced to tabulations of hourly median values of basic transmission loss and fading range. These values, as well as the hourly difference in transmission loss observed at two heights (height-gain) are also shown plotted in scatter diagrams versus time of day for each of the 13 two-week recording periods. The medians for each recording period of all hourly values of median basic transmission loss, fading range and height-gain are plotted versus time of year to show any seasonal variation in these statistics. A formula developed at NBS for predicting the median basic transmission loss in tropospheric scatter propagation is shown to be in good agreement with the data. The results of a study of the correlation of short-term signal variations observed at horizontally and vertically spaced antennas are given.

National Bureau of Standards, Washington, D. C.
LOW- AND VERY LOW-RADIOFREQUENCY TABLES OF GROUND WAVE PARAMETERS FOR THE SPHERICAL EARTH THEORY: THE ROOTS OF RICCATI'S DIFFERENTIAL EQUATION (SUPPLEMENTARY NUMERICAL DATA FOR NBS CIRCULAR 573), by J. R. Johler, L. C. Walters and C. M. Lilley. 1 Feb 59, 88p. 5 refs. Technical note no. 7.
Order from OTS $2.25 PB 151 366

The roots of Riccati's differential equation are tabulated in detail throughout the low- and very low-radiofrequency part of the spectrum. The zeroes and certain other parameters used in the calculation of the amplitude and phase of the ground wave by the rigorous series of residues are also tabulated. This paper supplements NBS Circular 573.

National Bureau of Standards, Washington, D. C.
PREDICTION OF THE CUMULATIVE DISTRIBUTION WITH TIME OF GROUND WAVE AND TROPOSPHERIC WAVE TRANSMISSION LOSS. PART I. THE PREDICTION FORMULA, by P. L. Rice, A. G. Longley and K. A. Norton. July 59, 81p. 26 refs. Technical note no. 15.
Order from OTS $1.50 PB 151 374

This report describes a method for predicting the cumulative distribution with time of transmission loss at frequencies above 10 megacycles per second over paths of arbitrary length. The method makes use of available information about terrain profiles and surface meteorological data, and is based on the CRPL radio standard atmospheres, in which the radio refractive index decreases linearly with height for the first kilometer above ground, and then decreases exponentially with height. Discussion of the theoreti-

cal basis for this formula and a demonstration of its accuracy by comparison with experimental data are reserved for later parts of this report.

National Bureau of Standards, Washington, D. C.
TECHNICAL CONSIDERATIONS LEADING TO AN OPTIMUM ALLOCATION OF RADIO FREQUENCIES IN THE BAND 25 TO 60 MC, by Kenneth A. Norton. June 59, 97p. 36 refs. Technical note no. 13.
Order from OTS $2.50 PB 151 372

Contents:
Present occupancy
Summary of conclusions and recommendations
General technical principles for radio frequency allocation
The allocation of High Power Fixed Services (RPIS) jointly with Medium Power Land Mobile Services
Technical conclusions
Some philosophy of radio frequency allocation
Recommended allocation procedures
Recommended further radio propagation research
Recommended further frequency allocation research
App. 1. Frequency assignments in the band 25-60 Mc
App. 2. Desired-carrier to noise, R, and desired-carrier to undesired-carrier, R_u, ratios required for satisfactory reception of f-s-k teletype and FM voice communication systems
App. 3. Sporadic E computations
App. 4. Long-term distribution of instantaneous received power
App. 5. Accurate equations for determining the interference to be expected between radio services operating on the same or adjacent channels
App. 6. The carrier frequency dependence of the transmitter power required to provide various types of service in the presence of noise

National Bureau of Standards, Washington, D. C.
TRANSMISSION LOSS IN RADIO PROPAGATION II, by Kenneth A. Norton. June 59, 152p. 84 refs. Technical note no. 12, formerly NBS rept. no. 5092.
Order from OTS $3.00 PB 151 371

In an earlier report with this title the concept of transmission loss was defined and its advantages explained. In this report a survey will be made of the transmission losses expected for a wide range of conditions, i.e., for distances from 10 to 10,000 statute miles; for radio frequencies from 10 kc to 100,000 Mc; for vertical or horizontal polarization; for ground waves, ionospheric waves, and tropospheric waves; over sea water or over land which may be either rough or smooth; and for various geographical and climatological regions.

Naval Ordnance Plant, Indianapolis, Ind.
TABLES OF BLACK BODY RADIATION AND THE TRANSMISSION FACTOR FOR RADIATION THROUGH WATER VAPOR, by Robert L. LaFara, Edward L. Miller and others. 15 Nov 55, 79p. 12 refs. NAVORD rept. 3171.
Order from LC mi$4.50, ph$12.30 PB 142 216

Tables have been computed of a radiation function which can be used in evaluating the distribution function of Planck's law. Results are given to an accuracy of 5 parts in 10^9 for wavelength-temperature products ranging from $\lambda T = 0.072$ cm°K to $\lambda T = 14.36$ cm°K. Also, tables of the transmission factor for electromagnetic radiation in the wavelength region from 1 micron to 14.8 microns are listed as a function of the amount of precipitable water contained in the path length. Simple explanations are given describing these two functions and their physical significance.

New York U., N. Y.
A STUDY OF THE GENERATION AND DETECTION OF ELECTROMAGNETIC WAVES IN THE MILLIMETER WAVE REGION, by J. H. Rohrbaugh. Scientific rept. no. 3, 1 Mar-31 May 58, on Millimeter Wave Project, Contract AF 19(604)2673. [1958] 29p. AFCRC TN-58-358; AD-160 801.
Order from LC mi$2.70, ph$4.80 PB 137 404

The drying system for the new spectrometer has been completed. A complete description of this system along with its associated circuitry is given. The optical alignment procedure is described as well as a major part of the detection system apparatus. This spectrometer is designed to be used in the very far IR.

Office of Scientific Research and Development. [Div. 6]
TRANSMISSION OF EXPLOSIVE IMPULSES IN THE SEA, by T. F. Johnston and R. W. Raitt (California U. Div. of War Research). Rept. on Contract OEMsr-30. 2 Dec 42, declassified 15 Nov 46. 53p. 6 refs. UCDWR-U8; AD-203 359.
Order from LC mi$3.60, ph$9.30 PB 142 278

The present report is intended to be as comprehensive and general as it can be made at this time. This report summarizes the most important conclusions that can be obtained from these data.

Washington U. Coll. of Engineering, Seattle.
ANALYSIS AND SYNTHESIS OF RADIATION PATTERN FOR THE TRAVELING WAVE TYPE SOURCES ON A CIRCULAR APERTURE, by Akira Ishimaru and Gedalia Held. Technical rept. no. 33 on Contract AF 19(604)4098. Mar 59, 59p. 2 refs. AFCRC-TN-59-170; AD-214 413.
Order from LC mi$3.60, ph$9.30 PB 142 328

This work presents an analysis and a synthesis of radiation pattern directed at an arbitrary angle produced by the sources composed of travelling wave type modes over a region of a circular aperture from r_1 to r_2. The source is expressed by a series of Hankel functions. It is shown that for the useful range of angle the radiation can be expressed by two functions by expressing a Bessel function as a sum of Hankel functions. These functions are similar to the ones encountered in the rectangular aperture case and the analysis is made in terms of sidelobes, beamwidth and the choice of r_1 and r_2. These expressions are also suitable to the synthesis of a narrow beam and a shaped beam. The analysis and synthesis are investigated with the sources having non-zero and zero magnitudes at the edges.

General Atronics Corp., Bala-Cynwyd, Pa.
PANORAMIC SPECTRUM ANALYZER, by Joseph T. Beardwood, III. Final rept. on Contract AF 19(604)3911. 28 Nov 58, 51p. 3 refs. Rept. 444-164-6; AFCRC-TR-58-350; AD-206 693.
Order from LC mi$3.60, ph$9.30 PB 139 657

Describes the work performend on the first phase of a two part program leading to development of a panoramic spectrum analyzer for speech, and the frequency resolution capabilities of the spectrum analyzer.

Institute of Research, Lehigh U. [Bethlehem, Pa.]
MEASUREMENT OF WALL HEAT TRANSFER AND OF TRANSITION TO TURBULENCE DURING HOT GAS AND REFRACTION FLOWS IN A SHOCK TUBE, by Albert J. Chabai. Doctoral thesis. Technical rept. no. 12, 1952-1958, on Contract N7onr-393(02). 1 Sep 58, 93p. 48 refs.
Order from LC mi$5.40, ph$15.30 PB 140 991

A thin film resistance thermometer has been developed for the study of transient boundary layer flows in the shock tube. The response time is less than 1 μsec. With this instrument wall temperatures are measured, gas-to-wall heat transfer rates may be determined, and transitions to turbulent flow detected. The instrument described allows previously unexplored boundary layer phenomena to be investigated.

Scuola di Perfezionamento in Fisica Teorica e Nucleare (Italy).
A SYSTEM OF COUPLED OSCILLATORS AS A FUNCTIONAL MODEL OF NEURONAL ASSEMBLIES, by V. Braitenberg, E. R. Caianiello and others. Scientific note no. 1 on Contract AF 61(052)96. Nov 58, 8p. AFOSR TN-59-470; AD-215 229.
Order from LC mi$1.80, ph$1.80 PB 142 142

Proposal of a model which promises to share with the living nervous system the properties of economy, capacity to recognize similarity, character of wholeness (Gestalt).

Woods Hole Oceanographic Institution, Mass.
THE WHOI WAVE TOWER RESEARCH FACILITY, by Charles E. Carver, Jr. Technical rept. on Contract Nonr-2196(00). Sep 58, 24p. Reference no. 58-51.
Order from LC mi$2.70, ph$4.80 PB 142 084

The project for which the wave tower facility described was designed is concerned with the measurement of the seaway such that it may be described in the form of two-dimensional or directional power spectra and the motions of a model ship operating therein. The measurement of waves-surface elevations in particular-can be most accurately obtained from a fixed platform in space. It was decided to erect such a platform in the form of a steel tower to which appropriate measuring instruments could be attached. The usefulness of such a structure serves also as a control station for the operation of self-propelled, remotely-controlled ship models. When instrumented with anemometers it is useful in the study of the generation of wind waves, and when used in conjunction with a similar structure, offers an ideal method for the investigation of sound transmission problems. This report is concerned with a description of the design, construction and installation of the WHOI Wave Tower Research Facility.

Photographic Equipment

Aeronautical Research Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
THE LIGHT AMPLIFIER KINESCOPE RECORDER WITH A SPEED OF 10 MILLION ASA UNITS FOR NIGHT PHOTOGRAPHY, by Radames K. H. Gebel. Apr 59, 12p. WADC Technical note 59-132; AD-214 762.
Order from OTS $0.50 PB 151 914

A speed in ASA units is calculated for the "CAT EYE" light amplifier. The result of a comparison test between an unmodified Lumicon and a Lumicon modified with a single stage intensifier image orthicon is discussed. The modified Lumicon still produced a 200 line picture where the unmodified Lumicon faded out completely.

Naval Air Development Center, Johnsville, Pa.
STUDY METHODS AND EQUIPMENT FOR TITLING 70mm AERIAL ROLL FILM PHOTOGRAPHY. 11 Sep 58, 29p. Rept. no. NADC AP-L5843. Final rept. on Proj. TED ADC PH-4561.3
Order from LC mi$2.40, ph$3.30 PB 142 267

The project was established to develop an acceptable method of titling 70mm aerial roll film and to fabricate a prototype titler. A titler which printed the information desired on individual photographs was developed for 9 1/2" aerial roll film. Due to the small size of 70mm aerial roll film, a coding system was suggested as one method of getting the desired information on film if the use of conventional titling characters proved impossible. (APEL) has developed a prototype titler and film advance table, which prints all the information required by NATO and ABC Standards using conventional type characters.

Woods Hole Oceanographic Institution, Mass.
THE LUMINESCENCE CAMERA, by L. R. Breslau and H. E. Edgerton. Technical rept. on Contract Nonr-1720(00). Apr 58, 21p. 6 refs. Ref. no. 58-14.
Order from LC mi$2.70, ph$4.80 PB 139 447

An instrument was designed and constructed for the purpose of causing the flashes of luminescence in the sea to trigger an underwater camera device and thus take photographs of the animals producing the flashes.

George Washington U., Washington, D. C.
MEASURES OF THE STRUCTURE OF SOME STATIC LINEAR ECONOMIC MODELS, by Stedman B. Noble. Rept. on Logistics Research Project, Contract Nonr-761(05). 11 Aug 58, 19p. 18 refs. Serial T-90/58.
Order from LC mi$2.40, ph$3.30 PB 142 390

This paper used graph analysis to study the decomposability and the structure of the static Leontief model and some mathematically similar static multi-sector multiplier models.

Stanford U., Calif.
ON THE CAPACITATED HITCHCOCK PROBLEM, by Harvey M. Wagner. Technical rept. no. 54 on Contract N6onr-25133. 20 May 58, 9p. 4 refs.
Order from LC mi$1.80, ph$1.80 PB 139 450

Documentation

Center for Documentation and Communication Research, Western Reserve U., Cleveland, Ohio.
THE APPLICATION OF STATISTICAL DECISION THEORY TO PROBLEMS OF DOCUMENTATION, by Harrison M. Wadsworth and Robert E. Booth. Technical note no. 8 on [Contract AF 49(638)357]. 9 Mar 59, 24p. 10 refs. AFOSR-TN-59-418; AD-215 225.
Order from LC mi$2.70, ph$4.80 PB 142 340

The application of statistical decision theory to documentation processes is considered. Choices of action in information retrieval situations are described and discussed quantitatively. Game theory is used to solve an illustrative problem involving documentalist's decision to stop or to continue searching. The players in this theoretical game are Nature and the documentalist. The documentalist used Bayes' solution to evaluate alternative strategies with Nature's strategies restricted. Concept of loss function based on utility theory is introduced.

Center for Documentation and Communication Research, Western Reserve U., Cleveland, Ohio.
THE PROCESSES OF DOCUMENTATION, by Robert E. Booth and Harrison M. Wadsworth. Technical note no. 7 on Contract AF 49(638)357. 18 Feb 59, 31p. 20 refs. AFOSR TN-59-222; AD-211 804.
Order from LC mi$3.00, ph$6.30 PB 142 296

A documentation system is defined as a complex pattern of interacting and interdependent processes which facilitates the use of recorded specialized knowledge through its presentation, reproduction, publication, dissemination, acquisition, characterization, storage, and retrieval. These processes are divided into two categories: (1) processes over which the documentalist normally exercises little or no control (2) processes over which the documentalist exercises a high degree of control.

Documentation, Inc. [Washington, D. C.]
COMPARISON OF CONVENTIONAL GROUPING AND INVERTED GROUPING OF CODES FOR THE STORAGE AND RETRIEVAL OF CHEMICAL DATA, by Eugene Miller, Delbert Ballard and others. Rept. on Contract AF 49(638)91. May 58, 26p. 3 refs. AFOSR TN-58-366; AD-154 272.
Order from LC mi$2.70, ph$4.80 PB 137 377

Direct experimental comparisons of the operation of different information storage and retrieval systems are rare, since each system is usually set up to process a unique store of information. This is especially true of comparisons between computers and specialized storage and retrieval devices. An opportunity to test the relative efficiencies of two search systems, one using conventional grouping of codes; the other using inverted grouping, was provided through release by the U. S. Patent Office of a punched-card index to steroid patents. Identical Patent Office index terms were used in both systems. Equal search results were thus obtainable from both systems. Comparison is made on the basis of equipment cost and operating time to put in the same material and find the same answers to a series of queries. An IBM sorter and a modified Type 101 machine were used for the conventionally grouped material, while a "Matrex" device was employed for the inverted group arrangement. The Matrex (inverted grouping) approach was somewhat more costly on input, and far more economical in both equipment cost and presentation of answers to queries. These differences are magnified as the size of the collection grows. A side result shows that the IBM sorter improves in efficiency over the Type 101 machine as the size of the collection increases.

Michigan U. [Research Inst.] Ann Arbor.
APPLICATION OF A TELEREFERENCE SYSTEM TO DIVISIONAL LIBRARY CARD CATALOGS, A FEASIBILITY ANALYSIS, by F. R. Bacon, N. C. Churchill and others. Final rept. May 58, 100p. 27 refs. 2733-1-F.
Order from LC mi$5.40, ph$15.30 PB 137 461

The purpose of this study was to determine the feasibility of the Telereference equipment based on a determination of the amount of equipment needed and any cost savings which might result from installing this equipment in the University Library system at the University of Michigan to replace the card catalogs in divisional libraries. The study was not intended to discover the extent to which scholarship and library use might be facilitated by the availability in each divisional library of the complete catalog in addition to existing divisional library catalogs.

Zator Co., Cambridge, Mass.
RESEARCH IN INDUCTIVE INFERENCE, by R. J. Solomonoff. Progress rept. for the year ending 31 Mar 59 on Contract AF 49(638)376. May 59, 15p.

6 refs. ZTB-130; AFOSR TN-59-[519]; AD-216 240.
Order from LC mi$2.40, ph$3.30 PB 142 292

The concept of "language" has been generalized to include patterns of many extremely diverse types. This will make it possible to apply inductive inference methods that were originally devised for simple phrase structure languages to more complex pattern types, such as arithmetic problems, transformational languages, and translation between pairs of phrase structure languages and transformational languages. Work has been done on devising machines that will improve their own methods of operation. Work completed includes new methods for discovering the grammars of finite state languages and phrase structure languages, and methods for determining all possible phrase structures of an arbitrary sentence of a phrase structure language of known grammar. Work has been done on methods of discovering approximation languages. Routines of this type are not accurate all of the time but are useful for getting quick, approximate results.

MISCELLANEOUS

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Sep 59.
Order from OTS $1.25, $10.00/year PB 151 342

Contents:
Articles:
Shielding of personnel from microwave energy, by R. W. Wright
Meteorological measurements in the south atlantic, by C. G. Purves, D. L. Randall, and D. L. Ringwalt
Linear Magnetostriction, by H. E. Stauss
Scientific Program:
Astronomy and Astrophysics: Radiochemical analysis of air-filter samples collected furing 1958
Chemistry: Metals coated with films of low-surface energy as reference electrodes for the measurements of contact potential differences. Hydrogen isotope exchange in phenylphosphinic acid and its anion
Electricity: Advanced sources of energy and conversion. Investigation of impulse-voltage breakdown in polyethylene
Mechanics: Apparatus to give autographically either a stress-total strain curve or a stress-inelastic microstrain curve. Shock spectra and design shock spectra. Dynamics of linear elastic structures. Analysis of the NRL light-gas gun. Electric gun for hypervelocity research
Metallurgy and Ceramics: Deoxidation of molybdenum Hydrogen-embrittlement susceptibility of some steels and nonferrous alloys. Irradiation-induced directional ordering in magnetic materials. Concentration contours of zinc diffusing into copper
Nuclear and Atomic Physics: Reactivity measurements on the NRL research reactor
Optics: Optimum f number for parabolic mirrors in non-image-forming optical systems
Radio: Propagation measurements in the 5-mm region. Effect of dielectric constant on certain characteristics of plane electromagnetic waves in nonmagnetic conductive media. Absorption, phase shift, and reflection of electromagnetic waves in ionized media. Electromagnetic probes for near-zone measurements. Microwave tube (monotron) research. Standard frequency comparison
Sound: Digital signal processing

ATOMIC ENERGY COMMISSION REPORTS

Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Reproduction in whole or part of any report listed herein is encouraged by the U.S. Atomic Energy Commission, subject to the approval of authors or originating sites. General inquiries from the industrial press about AEC-developed information should be directed to the Industrial Information Branch, Atomic Energy Commission, Washington 25, D. C.

General

Completion report, project Chariot - Phase I-- operation Plowshare. Holmes and Narver, Inc. Los Angeles, Calif. 1958. Contract AT(29-2)-20. (HN-111-942). 53p. Order from LC. Mi $3.90, ph $10.80. AECU-4039

Underground mining with nuclear explosives, by R. E. Smith, 4421. Sandia Corp. Albuquerque, N. Mex. May, 1959. Case no. 793.60. 29p. Order from OTS. $1.00. SCTM 53-59(51)

Earthmoving by nuclear explosives, by M. L. Merritt, 5110. Sandia Corp. Albuquerque, N. Mex. Mar 1959. Case 407.09. 14p. Order from OTS. 50 cents. SCTM 78-59(51)

Relative cratering efficiency of nuclear explosives, by L. J. Vortman - 5112. Sandia Corp. Albuquerque, N. Mex. Apr 1959. Case no. 407.09. 15p. Order from OTS. 50 cents. SCTM 114-59(51)

The construction of underground oil storage tanks utilizing nuclear explosives, by Roland H. Carlson. Sandia Corp. Albuquerque, N. Mex. Apr 1958. Contract AT(29-1)-789. 24p. Order from LC. Mi $2.70, ph $4.80. SCTM-233-58(51)

A nuclear explosion to determine the effects on hurricanes during the international geophysical year, by Jack W. Reed, 5111. Sandia Corp. Albuquerque, N. Mex. Aug 1956. Case no. 407.09. 11p. Order from OTS. 50 cents. SCTM-246-56(51)

Minium yield of nuclear explosive required for canal excavation, by R. H. Carlson, 5112 and others. Sandia Corp. Albuquerque, N. Mex. Dec 1958. Case no. 407.09. 24p. Order from OTS. 75 cents. SCTM 450-58(51)

Corporate author entries used by the Technical Information Service in cataloging reports, by Frances E. Stratton. AEC Technical Information Service Extension. Oak Ridge, Tenn. Jul 1959. 141p. Order from OTS. $2.75. TID-5059 (4th Rev.)

Biology and Medicine

Final progress report for December 16, 1957-- August 31, 1958, by Bruce Wallace. Long Island Biological Assn. Biological Lab., Cold Spring Harbor, N. Y. 1958. Contract AT(30-1)-557. (LIBA-10). 12p. Order from LC. Mi $2.40, ph $3.30. AECU-3988

The occurrence of natural root grafting in eastern white pine, pinus strobus L., and its ecological implications, by F. H. Bormann and Ben F. Graham, Jr. Dartmouth Coll. Hanover, N. H. 1959. Contract AT(30-1)-2037. 35p. Order from LC. Mi $3.00, ph $6.30. AECU-4020

The use of low level scintillation spectroscopy in the evaluation of radioactive contamination of the human body, by C. E. Miller and others. Argonne National Lab. Lemont, Ill. 1958. Contract W-31-109-eng-38. 30p. Order from OTS. $1.00. AECU-4156

Medical mission to Marshall Islands, by Leo M. Meyer. Brookhaven National Lab. Upton, N. Y. Jul 1957. 6p. Order from LC. Mi $1.80, ph $1.80. BNL-3306

Some effects of pile area effluent water on young silver salmon. A description of experiments carries out at the Fish Laboratory between December 6, 1946 and October 20, 1947, by P. A. Olson, Jr. Hanford Works. Richland, Wash. Feb 1948. Decl. Aug 1958. Contract W-31-109-Eng-31. Order from LC. Mi $2.70, ph $4.80. HW-8944

A one year study of radioactivity in Columbia River fish, by K. E. Herde. Hanford Works. Rich Wash. Oct 1948. Decl. Feb 1957. Contract W-31-109-Eng-52. 11p. Order from LC. Mi $2.40, ph $3.30. HW-11344

The accumulation of radioactivity as shown by a limnological study of the Columbia River in the vicinity of Hanford Works. Preliminary report, by R. W. Coopey. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Nov 1948. Decl. Jul 1952. 14p. Order from LC. Mi $2.40, ph $3.30. HW-11662

Thyroid radioiodine uptake measurement. A standard system for universal intercalibration, by Marshall Brucer, M.D. Oak Ridge Institute of Nuclear Studies. Oak Ridge, Tenn. Jun 1959. Contract AT-40-1-Gen-33. 329p. Order from OTS. $3.50. ORINS-19

Thorium toxicology. A list of selected references, by Hugh E. Voress, comp. Technical Information Service, AEC. May 1952. Decl. Mar 1959. 10p. Order from LC. Mi $1.80, ph $1.80. TID-3028

Fallout from nuclear tests at the Nevada test site, by Gordon M. Dunning. Radiation Effects of Weapons Branch. Division of Biology and Medicine, AEC, Wash., D. C. May 1959. 96p. Order from OTS. 90 cents. TID-5551

Some attempts to modify the early healing process of moderate second degree burns, by Bernard Lerman and J. Raymond Hinshaw. Univ. of Rochester. Atomic Energy Project., Rochester, N. Y. Dec 1958. Contract W-7405-eng-49. 14p. Order from LC. Mi $2.40, ph $3.30. UR-537

Autoradiographic study of lung clearance and distribution of polonium-210 after intratracheal injection, by Louis J. Casarett and Paul E. Morrow. Univ. of Rochester. Atomic Energy Project, Rochester, N. Y. Jan 1959. Contract W-7401-eng-49. 24p. Order from LC. Mi $2.70, ph $4.80. UR-540

Studies on the toxicology of aurin tricarboxylic acid, by W. L. Downs and others. Univ. of Rochester. Atomic Energy Project, Rochester, N. Y. Apr 1959. Contract W-7401-eng-49. 39p. Order from OTS. $1.25. UR-542

Progress report to the Atomic Energy Commission-January 1959. Technical report no. 6. Anderson Physical Lab. Champaign, Ill. Jan 1959. Contract AT(11-1)-544. 28p. Order from LC. Mi $2.70, ph $4.80. AECU-4016

Kinetics of the platinum-catalyzed hydrogen reduction of aqueous cobalt sulfate-ammonium acetate solutions. Technical report no. XXXV, by R. Ted Wimber and Milton E. Wadsworth. Univ. of Utah. Inst. for the Study of Rate Processes, Salt Lake City, Utah. Jan 1959. Project no. 1. Contract AT(11-1)-82. 53p. Order from LC. Mi $3.60, ph $9.30. AECU-4035

The chemistry and nuclear chemistry of the heavy elements. Progress report no. 4, by J. W. Cobble, ed. Purdue Univ. Lafayette, Ind. Feb 1959. Contract AT(11-1)-347. 72p. Order from LC. Mi $4.50, ph $12.30. AECU-4042

Mechanisms of surface adsorption in homogeneous reactor loops. Semi-annual report no. 2 for July 1 to December 31, 1957, by H. J. Eding. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. 1957. SRI project no. SD-2080-2. Contract W-7405-eng-26, subcontract 1081. 36p. Order from LC. Mi $3.00, ph $6.30. AECU-4049

Mechanisms of surface adsorption in homogeneous reactor loops. Final report for January 1, 1957 to June 30, 1958, by Harold J. Eding and E. M. Carr. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. 1958. SRI project no. SD-2080-2. Contract W-7405-eng-26, subcontract 1081. 34p. Order from LC. Mi $3.00, ph $6.30. AECU-4050

Observations of the method of Hess for determining precision lattice parameters, by Harry A. Eick and Paul W. Gilles. Univ. of Kansas. Lawrence, Kansas. Jan 1959. Project no. 5. Contract AT(11-1)-83. 7p. Order from LC. Mi $1.80, ph $1.80. AECU-4070

Strain cycling tests on large specimens of AISI type 347 stainless steel and 2-1/4 croloy, by A. K. Schnieder and J. J. LaCagnina, Jr. General Electric Co. Materials and Processes Lab., Schenectady, N. Y. Feb 1959. (DF-58-SL-211). 20p. Order from LC. Mi $2.40, ph $3.30. AECU-4082

The formation of detonation in saturated mixtures of knall gas-steam and in stoichiometric mixtures of deuterium-oxygen (heavy knall gas) saturated with deuterium oxide (heavy water). Final report, by James A. Luker and others. For Oak Ridge National Lab. Syracuse Univ. Research Inst., Syracuse, N. Y. Jan 1959. Contract W-7405-eng-26, subcontract 548. (SURI-Ch. E-273-591F). 363p. Order from OTS. $11.10, ph $57.60. AECU-4086

Reactions of metals with oxygen and steam. Final report for June 15, 1958 to February 15, 1959, by Fred E. Littman and Frank M. Church. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Feb 1959. Contract W-7405-eng-26. Subcontract 1088. SRI project SD-2116. 25p. Order from LC. Mi $2.70, ph $4.80. AECU-4092

Analysis of BrF_3, BrF_5 and UF_6 utilizing high resolution nuclear magnetic resonance spectra, by James N. Shoolery and others. Brookhaven National Lab. Upton, N. Y. 1955? 4p. Order from LC. Mi $1.80, ph $1.80. BNL-2382

Fused salt compositions, by C. J. Barton. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1957. Decl. Feb 1959. Contract W-7405-eng-26. 11p. Order from LC. Mi $2.40, ph $3.30. CF-57-6-81

Arc calcination of thorium oxide, by K. O. Johnson. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1958. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-58-6-94

On the kinetics of oxidation by nitric acid, by J. E. Savolainen. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1958. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-58-6-119

A comparison of fixed and moving bed ion-exchange, by C. W. Hancher. Oak Ridge National Lab. Oak Ridge, Tenn. Aug 1958. Contract W-7405-eng-26. 26p. Order from LC. Mi $2.70, ph $4.80. CF-58-8-53

Use of 95% nitric acid intitanium vessels, by A. Fitch. Oak Ridge National Lab. Oak Ridge, Tenn. Sep 1958. Contract W-7405-eng-26. 8p. Order from LC. Mi $1.80, ph $1.80. CF-58-9-63

Volatility pilot plant modifications– hydrogen fluoride condensers, FV-2004, FV-2005, by S. Mann. Oak Ridge National Lab. Oak Ridge, Tenn. Dec 1958. Contract W-7405-eng-26. 10p. Order from LC. Mi $1.80, ph $1.80. CF-58-12-55

Four-tower water treatment test facility (second run), by R. G. Murray and M. E. Tester. Goodyear Atomic Corp. Portsmouth, Ohio. Apr 1959. Contract AT(33-2)-1. 16p. Order from LC. Mi $2.40, ph $3.30. GAT-247(Sup. 1)

X-ray diffraction data on metal fluorides and similar compounds. A literature search, by R. D. Hamilton. Goodyear Atomic Corp. Portsmouth, Ohio. Feb 1959. Contract AT (33-2)-1. 41p. Order from LC. Mi $3.30, ph $7.80. GAT-T-571

Preliminary report on the X-ray photometric analysis of plutonium in concentrated nitrate solutions, by D. M. Newell. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jan 1955. Decl. with deletions Dec 1958. Contract W-31-109-Eng-52. 6p. Order from LC. Mi $1.80, ph $1.80. HW-32710(Del.)

Formal oxidation potentials of iron, plutonium, and neptunium determined with a controlled potential coulometer, by R. W. Stromatt and others. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Nov 1958. Contract W-31-109-Eng-52. 23p. Order from LC. Mi $2.70, ph $4.80. HW-58212

An automatic recording titrator, by Gerald Ross Umbreit and J. S. Fritz. Iowa State Coll. Ames Lab., Ames, Iowa. Dec 1957. Contract W-7405-eng-82. 54p. Order from OTS. $1.50. ISC-1021

The systems UF_4-SnF_2 and PuF_3-SnF_2, by B. J. Thamer and G. E. Meadows. Univ. of California. Los Alamos Scientific Lab., Los Alamos, N. Mex. Jan 1958. Contract W-7405-ENG-36. 31p. Order from OTS. $1.00. LA-2286

Density and viscosity of fused mixtures of lithium, beryllium, and uranium fluorides, by B. C. Blanke and others. Mound Lab. Miamisburg, Ohio. Dec 1956. Contract AT-33-1-GEN-53. 88p. Order from LC. Mi $4.00, ph $13.80. MLM-1086

Determination of free potassium metal in colored potassium chloride, by Louis Silverman and Mary Shideler. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Apr 1956. Contract AT-11-1-GEN-8. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-1421

Absorption spectra of molten salts, by Benson R. Sundheim and George Harrington. New York Univ. New York, N. Y. Mar 1959. Contract AT(30-1)-1938. 132p. Order from LC. Mi $6.90, ph $21.30. NYO-7742

Behavior of the magnetic lines of force in the magnetic pumping section of the B-2 stellarator. Technical memorandum no. 39, by Kenneth E. Wakefield. Princeton Univ. Project Matterhorn, Princeton, N. J. Dec 1957. Contract AT(30-1)-1238. 10p. Order from LC. Mi $1.80, ph $1.80. NYO-7881

Effect of scrape-off in systems containing helical stabilizing windings. Technical memorandum no. 45, by Kenneth E. Wakefield. Princeton Univ. Project Matterhorn, Princeton, N. J. May 1957. Decl. Nov 1958. 10p. Order from LC. Mi $1.80, ph $1.80. NYO-7892

Analytical chemistry division quarterly progress report for period ending March 26, 1952. Oak Ridge National Lab. Oak Ridge, Tenn. Oct 1952. Decl. with deletions Feb 1957. Contract W-7405-eng-26. 110p. Order from LC. Mi $5.70, ph $16.80. ORNL-1276(Del.)

Interim report on corrosion by alkali-metal fluorides: work to May 1, 1953, by G. M. Adamson and others. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1959. Contract W-7405-eng-26. 36p. Order from OTS. $1.25. ORNL-2337

Review and bibliography on: design and use of windows for optical measurements at elevated temperatures and pressures (1881-1959), by R. E. Biggers and J. M. Chilton. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 88p. Order from OTS. $2.25. ORNL-2738

Simultaneous determination of carbon, hydrogen, and nitrogen, by Jack W. Frazer. Univ. of California. Radiation Lab., Livermore, Calif. Feb 1958. Contract W-7405-eng-48. 8p. Order from LC. Mi $1.80, ph $1.80. UCRL-5134

High-temperature studies of the C_3 molecule (thesis), by John Leland Engelke. Univ. of California. Lawrence Radiation Lab., Berkeley, Calif. Apr 1959. Contract W-7405-eng-48. 86p. Order from OTS. $2.25. UCRL-8727

The isotope effect in the decarbonylation of benzoylformic acid, by Bernice Fingerman and Richard M. Lemmon. Univ. of California. Lawrence Radiation Lab., Berkeley, Calif. Apr 1959. Contract W-7405-eng-48. 11p. Order from OTS. 50 cents. UCRL-8731

The spectrochemical determination of residual hafnium in zirconium and zirconium alloys using D.C. arc excitation and a barium fluoride flux, by C. J. Harter and R. F. Farrell. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Oct 1958. 6p. Order from LC. Mi $1.80, ph $1.80. WAPD-CTA(GLA)-162-10

Preparation of lithium isotope standards: I. Separation of sodium and lithium by Dowex 50-X16 DVB resin, by W. C. Dietrich and R. E. Barringer. Union Carbide Corp. Union Carbide Nuclear Co., Y-12 Plant, Oak Ridge, Tenn. Jun 1959. Contract W-7405-eng-26. 14p. Order from OTS. 50 cents. Y-1254

Chemistry—Radiation and Radiochemistry

Summary of proceedings of an informal discussion on the radiation chemistry of water, January 8-9, 1959, by G. von Bitnau and others. Univ. of Notre Dame. Notre Dame, Ind. 1959. Radiation project. Contract AT(11-1)-38. 46p. Order from LC. Mi $3.30, ph $7.80. AECU-4057

Szilard-Chalmers processes. Quarterly status report for September 15-December 14, 1958, by Rodman A. Sharp. General Dynamics Corp. General Atomic Div., San Diego, Calif. Dec 1958. Project no. 49. Contract AT(04-3)-167. Project agreement no. 3. 14p. Order from LC. Mi $2.40, ph $3.30. GA-617

Laboratory development of a process for separating barium-140 from MTR fuel, by E. L. Anderson and others. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. Mar 1959. Contract AT (10-1)-205. 105p. Order from OTS. $2.50. IDO-14445

The determination of U-235 enrichment by an alpha counting technique, by H. M. Elland and A. F. Heltkamp, Jr. Knolls Atomic Power Lab. Schenectady, N. Y. Apr 1959. Contract W-31-109-Eng-52. 16p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-HME-1

SNAP-III-thermoelectric generator radiological safety analysis, by George P. Dix and others. Martin Co. Nuclear Div., Baltimore, Md. Feb 1959. 27p. Order from LC. Mi $2.70, ph $4.80. MND-P-2513

Chemical reactions between water and certain metals at elevated temperatures. Paper presented at Joint United Kingdom, United States, Canadian Conference on safety of reactors, Chalk River, Canada, October 13, 1953, by Harry Pearlman. North American Aviation, Inc. Downey, Calif. Jan 1954. Decl. Nov 1958. 23p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-858

Solutions of alkali metals in polyethers and vapor pressures of alkali metals, by Benson R. Sundheim and Fred Cafasso. New York Univ. New York, N. Y. Mar 1959. Contract AT (30-1)-1937. 128p. Order from LC. Mi $6.30, ph $19.80. NYO-2182

Radiation induced reactions between iodine and ethyl iodide, by Conrad N. Trumbore and Warren W. Miller. Pennsylvania State Univ. Coll. of Chemistry and Physics, University Park, Pa. Jan 1956. Contract AT(30-1)-1444. 30p. Order from LC. Mi $2.70, ph $4.80. NYO-3984

Decomposition of tritium oxide under its own radiation, by J. A. Ghormley and A. O. Allen. Oak Ridge National Lab. Oak Ridge, Tenn. Sep 1948. Contract W-7405-eng-26. 25p. Order from LC. Mi $2.70, ph $4.80. ORNL-128

A fluoride fuel in-pile loop experiment, by O. Sisman and others. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1957. Decl. Mar 1959. Contract W-7405-eng-26. 56p. Order from LC. Mi $3.60, ph $9.30. ORNL-1965

Radiation induced effects in heterogeneous organic systems. Progress report for period March 15, 1956 to March 15, 1957, by Russell H. Johnsen. Florida State Univ. Tallahassee, Fla. 1957. Contract AT(30-1)-2001. 17p. Order from LC. Mi $2.70, ph $4.80. ORO-190

Chemistry—Separation Processes for Plutonium and Uranium

Chemical engineering division summary report for January, February, March, 1959, by Stephen Lawroski. Argonne National Lab. Lemont, Ill. Jun 1959. Contract W-31-109-eng-38. 270p. Order from OTS. $4.00. ANL-5996

The fluorination of metallic titanium, by M. J. Steindler and others. Argonne National Lab. Lemont, Ill. Jun 1959. Contract W-31-109-eng-38. 6p. Order from OTS. 50 cents. ANL-6002

Preparation of yttrium fluoride in fluidized beds, by Irving E. Knudsen and Norman M. Levitz. Argonne National Lab. Lemont, Ill. May 1959. Contract W-31-109-eng-38. 14p. Order from OTS. 50 cents. ANL-6011

Construction materials for the hydrofluorinator of the fluoride-volatility process, by Paul D. Miller and others. Battelle Memorial Inst. Columbus, Ohio. Jun 1959. Contract W-7405-eng-92. 45p. Order from OTS. $1.50. BMI-1348

Processing of reactor fuels in molten 3 $ZrCl_4 \cdot 2$ $PoCl_3$, by T. A. Gens. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1958. Decl. Dec 1958. Contract W-7405-eng-26. 8p. Order from LC. Mi $1.80, ph $1.80. CF-58-1-49

Volatility Pilot Plant-waste salt transfer studies, by J. B. Ruch. Oak Ridge National Lab. Oak Ridge, Tenn. May 1958. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. CF-58-5-62

Equipment checkout prior to ARE processing, Volatility Pilot Plant run B-1, by C. L. Whitmarsh. Oak Ridge National Lab. Oak Ridge, Tenn. May 1958. Contract W-7405-eng-26. 15p. Order from LC. Mi $2.40, ph $3.30. CF-58-5-112

A series of seven flowsheet studies with nonradive salt, Volatility Pilot Plant runs C-9 through C-15, by C. L. Whitmarsh. Oak Ridge National Lab. Oak Ridge, Tenn. May 1958. Contract W-7405-eng-26. 63p. Order from LC. Mi $3.90, ph $10.80. CF-58-5-113

Thorex, analysis of modification costs, by R. V. Foltz and W. R. Winsbro. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1958. Contract W-7405-eng-26. 35p. Order from LC. Mi $3.00, ph $6.30. CF-58-6-4

Solvent extraction applied to reactor fuel processing; first quarter co-op report, by W. E. Dunn. Oak Ridge National Lab. Oak Ridge, Tenn. Jul 1958. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-58-7-129

Radiochemical reprocessing costs in an expanding nuclear economy, by C. E. Guthrie. Oak Ridge National Lab. Oak Ridge, Tenn. Nov 1958. Contract W-7405-Eng-26. 20p. Order from LC. Mi $2.70, ph $4.80. CF-58-11-69

The Darex Process: progress since the 1958 Geneva Conference, by F. G. Kitts and others. Oak Ridge National Lab. Oak Ridge, Tenn. Nov 1958. Contract W-7405-eng-26. 24p. Order from LC. Mi $2.70, ph $4.80.
CF-58-11-82

Evaluation of the Turco 4501 process for decontamination of the thorex dissolver, by J. R. Parrott. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1959. Contract W-7405-eng-26. 10p. Order from LC. Mi $1.80, ph $1.80.
CF-59-1-23

Dissolution of zirconium matrix fuels in molten fluoride salts, by R. W. Horton and M. E. Whatley. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1959. Contract W-7405-ent-26. 18p. Order from LC. Mi $2.40, ph $3.30.
CF-59-1-115

Poison rod requirements for a solid-fuel leacher tank, by B. E. Prince. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 10p. Order from LC. Mi $1.80, ph $1.80. CF-59-3-7

Dissolver for natural uranium fuel elements, by Vincent P. Caracciolo. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Dec 1958. Contract AT(07-2)-1. 23p. Order from OTS. 75 cents.
DP-313

Detection of nitrite ion in plutonium nitrate solutions, by M. O. Fulda. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Dec 1958. Contract AT (07-2)-1. 7p. Order from OTS. 50 cents.
DP-336

Effects of solution composition on the corrosion of the Redox H-4 oxidizer, by Norman D. Groves and others. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Aug 1955. Decl. with deletions Feb 1959. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $2.40, ph $3.30. HW-33374(Del.)

Integrated maintenance management in the chemical processing department. A case study from the Redox Plant. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Dec 1957. Contract W-31-109-Eng-52. 30p. Order from LC. Mi $2.70, ph $4.80.
HW-54046

Preliminary darex flowsheet, by J. J. Shefcik and A. M. Platt. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Dec 1958. Contract W-31-109-Eng-52. 9p. Order from LC. Mi $1.80, ph $1.80.
HW-58600

Random loading of E-metal dissolver, by N. Ketzlach. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Feb 1959. Contract W-31-109-Eng-52. 26p. Order from LC. Mi $2.70, ph $4.80.
HW-59301

Technical progress report for October through December 1958. Idaho Chemical Processing Plant, by C. E. Stevenson. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. May 1959. Contract AT(10-1)-205. 36p. Order from OTS. $1.00. IDO-14467

A conceptual design and cost study for chemically processing irradiated reactor fuels. Job 7011. Vitro Corp. of America. Vitro Engineering Div., New York, N. Y. Aug 1955. Decl. Apr 1959. 64p. Order from LC. Mi $4.50, ph $12.30. KLX-1745

Decontamination of thorium-uranium alloys by consumable arc-melting, by R. E. Johnson and E. W. Murbach. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT(11-1)-GEN-8. 14p. Order from OTS. 50 cents.
NAA-SR-3590

The high temperature separation of plutonium and fission products from irradiated uranium carbide, by Charles R. F. Smith. North American Aviation, Inc. Downey, Calif. Jul 1953. Decl. Nov 1958. 18p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-729

Extraction of polonium from molten bismuth with fused sodium hydroxide, by Rex A. Barney. North American Aviation, Inc. Downey, Calif. Jul 1953. Decl. Nov 1958. 3p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-746

Controlled Thermonuclear Processes

Ultrahigh vacuum techniques. Progress report. Research report 100FF1054-R2. Westinghouse Electric Corp. Research Labs., East Pittsburgh, Pa. Jun 1957. Contract AT-11-1-gen-14. 31p. Order from LC. Mi $3.00, ph $6.30.
AECU-3889

Ultrahigh vacuum techniques. Progress report no. 3 for July 1 to December 31, 1957. Research report 403FF220-R1. Westinghouse Electric Corp. Research Labs., East Pittsburgh, Pa. Dec 1957. 13p. Order from LC. Mi $2.40, ph $3.30. AECU-3890

Proposed Sherwood experiment, by John S. Luce. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1957. Decl. Nov 1958. 11p. Order from LC. Mi $2.40, ph $3.30. CF-56-2-152

Critical experiments with arrays or ORR and BSR fuel elements, by J. K. Fox and L. W. Gilley. Oak Ridge National Lab. Oak Ridge, Tenn. Oct 1958. Contract W-7405-eng-26. 6p. Order from LC. Mi $1.80, ph $1.80. CF-58-9-40

Some chemical problems associated with thermonuclear reactors, by W. Davis, Jr. Oak Ridge National Lab. Oak Ridge, Tenn. Nov 1958. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-58-11-95

Boundary conditions and conservation properties of FOPP, a plasma Fokker-Planck code, by T. K. Fowler and others. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 15p. Order from LC. Mi $2.40, ph $3.30. CF-59-2-75

The stellarator approach to thermonuclear power, by Robert G. Mills. Princeton Univ. Project Matterhorn, Princeton, N. J. Dec 1958. Contract AT(30-1)-1238. 20p. Order from LC. Mi $2.40, ph $3.30. NYO-2391

Maintenance of a constant axial magnetic field in an interrupted solenoid by means of rectangular current sheets. Technical memorandum no. 9, by William A. Newcomb. Princeton Univ. Project Matterhorn, Princeton, N. J. Oct 1953. 19p. Order from LC. Mi $2.40, ph $3.30. NYO-3722

Inductive energy storage for confining field. Technical memorandum no. 24, by R. G. Mills. Princeton Univ. Project Matterhorn, Princeton, N. J. Apr 1956. Decl. Nov 1958. 12p. Order from LC. Mi $2.40, ph $3.30. NYO-6369

Some observation on the behavior of copper traps and UHV systems of moderate size. Technical memo no. 40, by Donald J. Grove. Princeton Univ. Project Matterhorn, Princeton, N. J. Feb 1957. Contract AT(30-1)-1238. 18p. Order from LC. Mi $2.40, ph $3.30. NYO-7883

Determination of machine transform (IOTA) for B-3, using data obtained from a conducting paper analogue. Technical memorandum no. 46, by Kenneth E. Wakefield. Princeton Univ. Project Matterhorn, Princeton, N. J. Jun 1957. Decl. Aug 1958. 20p. Order from LC. Mi $2.40, ph $3.30. NYO-7893

A proposal for the B-4 machine. Technical memorandum no. 47, by J. File and others. Princeton Univ. Project Matterhorn, Princeton, N. J. Jul 1957. Decl. Nov 1958. 21p. Order from LC. Mi $2.70, ph $4.80. NYO-7894

Print and punch modification of for transit. Technical memo 67, by John M. Greene. Princeton Univ. Project Matterhorn, Princeton, N. J. Feb 1959. Contract AT(30-1)-1238. 11p. Order from LC. Mi $2.40, ph $3.30. NYO-8070

Report of testing on a type 5553 ignitron. Technical memo 66, by Charles A. Nittrouer. Princeton Univ. Project Matterhorn, Princeton, N. J. Feb 1959. Contract AT(30-1)-1238. 11p. Order from LC. Mi $2.40, ph $3.30. NYO-8073

Some properties of a steady state high-energy injection device (DCX), by A. Simon and M. Rankin. Oak Ridge National Lab. Oak Ridge, Tenn. Sep 1957. Decl. Nov 1958. Contract W-7405-eng-26. 42p. Order from LC. Mi $3.00, ph $6.30. ORNL-2354

Unstable plasma oscillations in a magnetic field, by E. G. Harris. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1959. Contract W-7405-eng-26. 29p. Order from OTS. $1.00. ORNL-2728

ARC research. Some considerations on the application of the A-48 to the Sherwood Program, by John R. Hiskes. Univ. of California. Radiation Lab., Berkeley, Calif. Nov 1956. 8p. Order from LC. Mi $1.80, ph $1.80. UCRL-3188

Three ideas relating to E x H thermonuclear machines, by Harold P. Furth. Univ. of California. Radiation Lab., Berkeley, Calif. Dec 1958. 9p. Order from LC. Mi $1.80, ph $1.80. UCRL-5431-T

The Homopolar device, by O. A. Anderson and others. Univ. of California. Radiation Lab., Berkeley, Calif. Jan 1958. Decl. Aug 1958. Contract W-7405-eng-48. 58p. Order from LC. Mi $3.60, ph $9.30. UCRL-8062

Criticality Studies

Request for preliminary criticality review of reactor fuel reprocessing schemes, by A. R. Irvine and others. Oak Ridge National Lab. Oak Ridge, Tenn. Sep 1958. Contract W-7405-eng-26. 43p. Order from LC. Mi $3.30, ph $7.80. CF-58-9-77

Criticality data and nuclear safety guide applicable to the Oak Ridge Gaseous Diffusion Plant, by H. F. Henry and others. Oak Ridge Gaseous Diffusion Plant. Oak Ridge, Tenn. May 1959. Contract W-7405-eng-26. 53p. Order from OTS. $1.50. K-1019 Fifth Rev.

A generalized and consistent method for calculating the critical mass of homogeneous aqueous uranyl fluoride solutions, by O. W. Hermann. Union Carbide Corp. Union Carbide Nuclear Co., Paducah, Ky. Jun 1959. Contract W-7405-eng-26. 24p. Order from OTS. 75 cents. KY-294

Critical assemblies of uranium metal, by R. Gwin and W. T. Mee. Union Carbide Corp. Union Carbide Nuclear Co., Y-12 Plant, Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 16p. Order from OTS. 75 cents. Y-1248

Geology and Mineralogy

1954 exploration drilling in the Boulder Batholith, Jefferson and Silver Bow Counties, Montana, by Wayne S. Moen. Grand Junction Operations Office. Salt Lake Branch Office, AEC, Salt Lake City, Utah. Jan 1959. 39p. Order from OTS. $1.25. RME-2044 (Rev.)

Notes on geophysical work at Marysvale, Utah, by Ray E. Gilbert. Grand Junction Operations Office. Salt Lake Branch Office, AEC, Salt Lake City, Utah. May 1958. 25p. Order from OTS. 75 cents. RME-2050

Impedance of a folded circular loop antenna, by Charles W. Harrison, Jr. Sandia Corp. Albuquerque, N. Mex. Jan 1959. Contract AT-(29-1)-789. 27p. Order from LC. Mi $2.70, ph $4.80. SCTM-15-59(14)

Health and Safety

Collection and analysis of radioactive material from Sibley Quarry, by Walter F. Snyder and John V. Nehemias. For Detroit Edison Co. National Sanitation Foundation. Ann Arbor, Mich. Dec 1958. 19p. Order from LC. Mi $2.40, ph $3.30. AECU-4017

An investigation of the fate of fission products in the Illinois Waterway system, by I. E. Thomas and others. Northwestern Univ. Technological Inst., Evanston, Ill. Jan 1959. Contract AT (11-1)-353. 52p. Order from LC. Mi $3.60, ph $9.30. AECU-4025

Dispersion in tidal estuaries, by P. J. Huiswaard and others. Northwestern Univ. Technological Inst., Evanston, Ill. Jan 1959. Contract AT (11-1)-353. 103p. Order from LC. Mi $5.70, ph $16.80. AECU-4037

Fall-out of radioactivity in the Chicago area during January, February, April, and May, 1951. Part I. Radiochemical studies, by A. F. Stehney. Part II. Radioautographic studies, by I. B. Berlman. Argonne National Lab. Lemont, Ill. Dec 1951. Decl. with deletions Apr 1959. Contract W-31-109-eng-38. 31p. Order from LC. Mi $3.00, ph $6.30. ANL-4739 (Del.)

Comments on the handling of plutonium, by M. J. Steindler. Argonne National Lab. Lemont, Ill. Jun 1959. Contract W-31-109-eng-38. 26p. Order from OTS. 75 cents. ANL-6021

Radioactivity detected in precipitation and settled dust, April-May 1951, by M. M. Weiss. Brookhaven National Lab. Upton, N. Y. 1951. 6p. Order from LC. Mi $2.40, ph $3.30. BNL-116

A study of the airborne radioactivity at Brookhaven National Laboratory from the Nevada tests, March through June 1953, by Max M. Weiss. Brookhaven National Lab. Upton, N. Y. Nov 1953. 18p. Order from LC. Mi $2.40, ph $3.30. BNL-252

Fallout studies at BNL during the summer of 1956, by J. Weiss and F. P. Cowan. Brookhaven National Lab. Upton, N. Y. 1956. 22p. Order from LC. Mi $2.70, ph $4.80. BNL-436

Study of the fall-out in the grain collected September 22, 1954, by M. M. Weiss. Brookhaven National Lab. Upton, N. Y. Nov 1954. Decl. Apr 1959. 9p. Order from LC. Mi $1.80, ph $1.80. BNL-2643

Analysis of "fall-out" activity at ORNL, by S. A. Reynolds. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1953. Decl. Feb 1959. Contract W-7405-eng-26. 3p. Order from LC. Mi $1.80, ph $1.80. CF-53-3-173

Atomic weapons test fall-out at ORNL on March 19, 1953, by R. L. Bradshaw and W. D. Cottrell. Oak Ridge National Lab. Oak Ridge, Tenn. Jul 1953. Contract W-7405-eng-26. 14p. Order from LC. Mi $2.40, ph $3.30. CF-53-7-239

Applied health physics semi-annual report for July 1957-December 1956. Oak Ridge National Lab. Oak Ridge, Tenn. 1956. Contract W-7405-eng-26. 40p. Order from LC. Mi $3.00, ph $6.30. CF-57-1-173

Applied health physics annual report for January-December 1957. Oak Ridge National Lab. Oak Ridge, Tenn. 1957. Contract W-7405-eng-26. 31p. Order from LC. Mi $3.00, ph $6.30. CF-57-12-146

Gamma-ray and fast-neutron dose rates in air as a function of distance from the TSF reactor, by F. N. Watson. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1958. Contract W-7405-eng-26. 6p. Order from LC. Mi $1.80, ph $1.80. CF-58-4-6

Ozone explosion in irradiated cryogenic apparatus and implications upon N. S. Savannah gaseous waste disposal system, by William B. Cottrell. Oak Ridge National Lab. Oak Ridge, Tenn. Jul 1958. Contract W-7405-eng-26. 9p. Order from LC. Mi $?.40, ph $3.30. CF-58-7-97

Safety requirements for the design of radiochemical processing facilities, by W. R. Winsbro, and others. Oak Ridge National Lab. Oak Ridge, Tenn. Oct 1958. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. CF-58-10-112

High-altitude sampling techniques. Progress report no. 6 for February 1959, by Henry Halle. Univ. of Chicago. Chicago Midway Labs., Chicago, Ill. 1959. Contract AT(11-1)-308. (CML-SR-M-124-6). 16p. Order from LC. Mi $2.40, ph $3.30. CML-M-124-6

A method of analyzing rainouts, by James H. Bick and John A. Weaver. General Electric Co. Aircraft Nuclear Propulsion Project, Cincinnati, Ohio. 1953. Decl. Apr 1959. 16p. Order from LC. Mi $2.40, ph $3.30. DC-53-5-14(Del.)

Radioactivity in the environs of the Savannah River Plant, January to July 1954, by J. H. Horton. Du Pont de Nemours (E. I.) & Co. Savannah River Lab., Augusta, Ga. Nov 1954. Apr 1959. Contract AT(07-2)-1. 27p. Order from LC. Mi $2.70, ph $4.80. DP-92

Removal of tritium contamination from surfaces of metals, by Albert E. Symonds, Jr. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Apr 1959. Contract AT(07-2)-1. 19p. Order from OTS. 75 cents. DP-367

Unclassified summary of safety and health physics progress reports (from fourth quarter FY-1955 to second quarter FY-1959). Goodyear Atomic Corp. Portsmouth, Ohio. Apr 1959. Contract AT(33-2)-1. 153p. Order from LC. Mi $7.50, ph $24.30. GAT-T-655

Strontium program. Summary report for October 1957, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1957. 80p. Order from LC. Mi $4.50, ph $12.30. HASL-1

Strontium program summary report for November 1957, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1957. 72p. Order from LC. Mi $3.90, ph $10.80. HASL-5

Strontium program. Summary report for December 1957, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1957. 61p. Order from LC. Mi $3.90, ph $10.80. HASL-8

Strontium program. Summary report for January 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1958. 73p. Order from LC. Mi $4.50, ph $12.30. HASL-10

Strontium program. Summary report for February 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1958. Changed from Official Use Only Apr 1959. 58p. Order from LC. Mi $3.60, ph $9.30. HASL-23

Strontium program summary report for March 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1958. 64p. Order from LC. Mi $3.90, ph $10.80. HASL-28

Strontium program. Summary report for April 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC.

New York, N. Y. Apr 1958. 55p. Order from LC. Mi $3.60, ph $9.30. HASL-34

Strontium program. Summary report for May 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. May 1958. 82p. Order from LC. Mi $4.80, ph $13.80. HASL-38

Strontium program summary report for June and July 1958, by Edward P. Hardy, Jr. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Aug 1958. 88p. Order from LC. Mi $4.80, ph $13.80. HASL-47

Sunshine report for March 30 to July 30, 1954. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Sep 1954. Decl. Apr 1959. 16p. Order from LC. Mi $2.40, ph $3.30. HASL-S-1

Sunshine report, August 1954. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Nov 1954. Decl. Apr 1959. 14p. Order from LC. Mi $2.40, ph $3.30. HASL-S-2

Preliminary cooperative sunshine report. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Oct 1954. Decl. Apr 1959. 11p. Order from LC. Mi $2.40, ph $3.30. HASL-SC-1

Preliminary report on existing active particle hazard-200 areas, by M. L. Mickelson. Hanford Works. Richland, Wash. Oct 1947. Decl. Feb 1957. Contract W-31-109-Eng-52. 3p. Order from LC. Mi $1.80, ph $1.80. HW-7865

Action taken on the spot contamination in the separations plant areas, by H. M. Parker. Hanford Works. Richland, Wash. Oct 1947. Decl. Feb 1956. Contract W-31-109-Eng-52. 6p. Order from LC. Mi $1.80, ph $1.80. HW-7920

Radioactive particles in the atmosphere. January 1951-March 1951, by W. Singlevich. Hanford Works. Richland, Wash. Apr 1951. Decl. Apr 1959. Contract W-31-109-Eng-52. 30p. Order from LC. Mi $2.70, ph $4.80. HW-20810

A report of particle contamination, October-December 1951, by H. J. Paas and C. W. Thomas. Hanford Works. Richland, Wash. Feb 1952. Decl. Apr 1959. Contract W-31-109-Eng-52. 34p. Order from LC. Mi $3.00, ph $6.30. HW-23517

Monitoring survey-Richland to Arco, period May 9-11, 1952, by J. F. Honstead. Hanford Works, Richland, Wash. Jun 1952. Decl. Apr 1959. Contract W-31-109-eng-52. 14p. Order from LC. Mi $2.40, ph $3.30. HW-24727

Radioactive particle fallout in the Hanford environs from Nevada nuclear explosions, Spring, 1953, by H. J. Paas and others. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Aug 1953. Decl. Apr 1959. Contract W-31-109-Eng-52. 52p. Order from LC. Mi $3.60, ph $9.30. HW-28925

Teflon bellows pulse generators for solvent extraction pulse columns, by P. B. McCarthy. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jan 1954. Decl. Jan 1955. Contract W-31-109-Eng-52. 12p. Order from LC. Mi $2.40, ph $3.30. HW-30588

The Hanford atomic project and Columbia River pollution, by H. V. Clukey. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Dec 1957. Contract W-31-109-Eng-52. 21p. Order from LC. Mi $2.70, ph $4.80. HW-54243(Rev.)

The nuclear safety of fissile materials, by E. D. Clayton. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Feb 1959. Contract W-31-109-Eng-52. 30p. Order from LC. Mi $2.70, ph $4.80. HW-59066

The factors influencing the biological fate and persistence of radioactive fall-out, by R. G. Lindberg and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Aug 1955. Decl. Apr 1959. Project 37.1 of OPERATION TEAPOT. 72p. Order from LC. Mi $4.50, ph $12.30. ITR-1177

Measurements of beta and gamma ray characteristics of shot debris and fall-out of nuclear weapons. Preliminary report, by H. D. LeVine and R. T. Graveson. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. 1955. Decl. Apr 1959. Project 30.3 of OPERATION TEAPOT. 46p. Order from LC. Mi $3.30, ph $7.80. ITR-1185

Surface alpha monitoring as a method of measuring plutonium fallout. Test group 57, program 74 of Operation Plumbbob, by R. E. Butler. Sandia Corp. Albuquerque, N. Mex. May 1957. Decl. with deletions Apr 1959. 110p. Order from LC. Mi $6.00, ph $18.30. ITR-1513(Del.)

Summary report, test group 57. Operation Plumbbob-preliminary report, by J. D. Shreve, Jr. Sandia Corp. Albuquerque, N. Mex. Apr 1958. Decl. with deletions Apr 1959. 143p. Order from LC. Mi $4.80, ph $13.80. ITR-1515(Del.)

Radiological development activities in the health physics unit. Semiannual progress report for January-June 1955, by L. J. Cherubin and J. J. Fitzgerald. Knolls Atomic Power Lab. Schenectady, N. Y. 1955. Contract W-31-109-Eng-52. 49p. Order from LC. Mi $2.70, ph $4.80. KAPL-1409

Semiannual progress report of radiological development activities in health physics, by R. J. Feinberg. General Electric Co. Knolls Atomic Power Lab., Schenectady, N. Y. Jul-Dec 1957. Contract W-31-109-Eng-52. 27p. Order from OTS. $1.00. KAPL-2031

Design criteria for the type M-130 standardized shielded shipping container, by B. B. Biggs. Knolls Atomic Power Lab. Schenectady, N. Y. Jan 1958. Contract W-31-109-Eng-52. 10p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-BBB-2

KAPL environmental contamination pattern due to KAPL operations and outside influences, by I. J. Cherubin. Knolls Atomic Power Lab. Schenectady, N. Y. Apr 1954. Contract W-31-109-Eng-52. 56p. Order from LC. Mi $3.30, ph $7.80. KAPL-M-LJC-6

Monitoring of cow's milk for fresh fission products following an atomic detonation, by William S. Johnson and others. Los Alamos Scientific Lab. Los Alamos, N. Mex. Oct 1953. Contract W-7405-eng-36. 13p. Order from LC. Mi $2.40, ph $3.30. LA-1597

Some observations on air sampling techniques used at the Nevada Proving Ground, by C. P. Skillern and others. Los Alamos Scientific Lab. Los Alamos, N. Mex. Jun 1954. Changed from Official Use Only Oct 1956. Contract W-7405-eng-36. 54p. Order from LC. Mi $3.60, ph $9.30. LA-1685

Survey of Los Alamos and Pueblo Canyon for radioactive contamination and radioassay tests run on sewer-water samples and water and soil samples taken from Los Alamos and Pueblo Canyons, by William H. Kingsley and others. Los Alamos Scientific Lab. Los Alamos, N. Mex. Feb 1947. Contract W-7405-eng-36. 47p. Order from LC. Mi $3.90, ph $10.80. LAMS-516

Fall-out studies with a laboratory controlled model, by Ford Kalil. Los Alamos Scientific Lab. Los Alamos, N. Mex. Aug 1955. Contract W-7405-eng-36. 75p. Order from LC. Mi $3.60, ph $9.30. LAMS-1945

The wind variability of fall-out patterns, by Leon Sherman. Los Alamos Scientific Lab. Los Alamos, N. Mex. Mar 1956. 24p. Order from LC. Mi $2.70, ph $4.80. LAMS-2020

Air, precipitation, and surface contamination at certain localities in New Mexico from Operation Teapot, spring 1955, by William S. Johnson. Los Alamos Scientific Lab. Los Alamos, N. Mex. Apr 1956. Contract W-7405-eng-36. 26p. Order from LC. Mi $2.70, ph $4.80. LAMS-2031

A survey of some Los Alamos county canyons for radioactive contamination, spring, 1953 to spring, 1955, by Aubrey O. Dodd. Los Alamos Scientific Lab. Los Alamos, N. Mex. Apr 1956. Contract W-7405-eng-36. 17p. Order from LC. Mi $2.40, ph $3.30. LAMS-2038

Studies in the accumulation of radioactive elements in oncorhynchus tschawtscha (Chinook Salmon) exposed to a medium of pile effluent water, by K. E. Herde. Hanford Engineer Works. Richland, Wash. Oct 1946. Decl. Mar 1957. Contract W-31-109-Eng-52. (HW-3-5064). 21p. Order from LC. Mi $2.70, ph $4.80. M-4130

Project sunshine bulletin number 11. Univ. of Chicago. Enrico Fermi Inst. for Nuclear Studies., Chicago, Ill. Dec 1955. Decl. Apr 1959. 63p. Order from LC. Mi $3.90, ph $10.80. M-5949

Strontium-90: bibliography, by M. Comstock. Brookhaven National Lab. Upton, N. Y. Dec 1957. 10p. Order from LC. Mi $1.80, ph $1.80. M-6472

1958 panel studies, by J. Weiss and F. P. Cowan. Brookhaven National Lab. Upton, N. Y. May 1959. 4p. Order from LC. Mi $1.80, ph $1.80. M-7000

Report of off-site radiological safety activities, operation Teapot, Nevada test site, spring, 1955, by J. B. Sanders and others. Nevada Test Organization. Off-Site radiological Safety Activities, AEC. 1955. 156p. Order from LC. Mi $7.50, ph $24.30. M-7001

Report of off-site radiological safety activities, project 56, Nevda test site, winter, 1955, by J. B. Sanders and others. Nevada Test Organization. Off-Site Radiological Safety Activities, AEC. 1955. 100p. Order from LC. Mi $5.70, ph $16.80. M-7002

Report of off-site radiological safety activities for project 57, Nevada Test Site, April 1957, by O. R. Placak and others. Nevada Test Organization. Off-Site Radiological Safety Activities, AEC. 1957. 18p. Order from LC. Mi $2.70, ph $4.80. M-7003

Report of off-site radiological safety acctivities for project 56, Nevada Test Site, December 1957, by O. R. Placak and others. Nevada Test Organization. Off-Site Radiological Safety Activities, AEC. 1957. 17p. Order from LC. Mi $2.40, ph $3.30. M-7004

Report of off-site radiological safety activities for project 58-A, Nevada Test Site, February-March 1958, by O. R. Placak and others. Nevada Test Organization. Off-Site Radiological Safety Activities, AEC. 1958. 9p. Order from LC. Mi $1.80, ph $1.80. M-7005

Dust and precipitation sampling program, April thru June 1951. New York Operations Office. Health and Safety Div., AEC. New York, N. Y. 1951. 31p. Order from LC. Mi $3.00, ph $6.30. M-7008

Environmental radioactivity at CANEL. Summary of data for 1957, by Gerald W. Kerr. United Aircraft Corp. Pratt and Whitney Aircraft Div., Middletown, Conn. Dec 1958. 11p. Order from LC. Mi $2.40, ph $3.30. M-7028

Environmental radioactivity at CANEL. Summary of data for 1958, by Gerald W. Kerr. United Aircraft Corp. Pratt and Whitney Aircraft Div., Middletown, Conn. Mar 1959. 16p. Order from LC. Mi $2.40, ph $3.30. M-7029

Pacific sea water samples. New York Operations Office. Health and Safety Lab., AEC. New York, N. Y. Jun 1958. 101p. Order from LC. Mi $5.40, ph $15.30. M-7067

At estimate of neutron-induced radioactivity in soil from weapon detonations, by Alfred W. Klement, Jr. Division of Biology and Medicine, AEC. May 1958. Decl. with deletions Apr 1959. 4p. Order from LC. Mi $1.80, ph $1.80. M-7081(Del.)

Programmatic investigations, fall-out materials: their chemical and physical properties and utilization by plants. Appendix C. Atomic Energy Commission. Washington, D. C. N.D. Decl. with deletions Apr 1959. 10p. Order from LC. Mi $2.40, ph $3.30. M-7085(Del.)

Environmental radioactivity survey. Laboratory summaries 1-3 for August 1958 through March 1959, by C. W. Myers and others. New York Shipbuilding Corp. Camden, N. J. 1959. 6p. Order from LC. Mi $1.80, ph $1.80. M-7086

Fallout measurement, January 1 to November 15, 1958. Los Alamos Scientific Lab. Los Alamos, N. Mex. 1958. Contract W-7405-eng-36. 21p. Order from LC. Mi $2.70, ph $4.80. M-7097

Radioactive debris from operations BUSTER and JANGLE. Observations beyond 200 miles from the test site. New York Operations Office. Health and Safety Div., AEC. New York, N. Y. Jan 1952. Decl. with deletions Apr 1959. 112p. Order from LC. Mi $6.00, ph $18.30. NYO-1576(Del.)

Feasibility study on an electrostatic stratospheric dust sampler, by H. J. Di Giovanni and others. Del Electronics Corp. Mount Vernon, N. Y. Dec 1958. Contract AT(30-1)-2173. 38p. Order from LC. Mi $3.00, ph $6.30. NYO-2367

Radioactive debris from operations TUMBLER and SNAPPER. Observations beyond 200 miles from the test site. Part I. New York Operations Office. Health and Safety Div., AEC., New York, N. Y. Jan 1953. Decl. with deletions Apr 1959. 63p. Order from LC. Mi $3.90, ph $10.80. NYO-4505(Del.)

Radioactive debris from operations TUMBLER and SNAPPER. Observations beyond 200 miles from the test site. Part II, by Robert J. List. Weather Bureau. Washington D. C. Feb 1953. Decl. with deletions Apr 1959. 145p. Order from LC. Mi $7.50, ph $24.30. NYO-4512(Del.)

Radioactive debris from operations UPSHOT and KNOTHOLE. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Jun 1954. Decl. with deletions Apr 1959. 63p. Order from LC. Mi $4.80, ph $13.80. NYO-4552(Del.)

A meteorological analysis of the transport of debris from Operation Ivy, by Lester F. Hubert and others. Weather Bureau. Washington, D. C. Oct 1953. Decl. with deletions Apr 1959. 138p. Order from LC. Mi $7.50, ph $24.30. NYO-4555(Del.)

The transport of atomic debris from Operation Upshot-Knothole, by Robert J. List. Weather Bureau. Washington, D. C. Jun 1954. Decl. with deletions Apr 1959. 192p. Order from LC. Mi $8.70, ph $30.30. NYO-4602(Del.)

Radioactive debris from Operation Castle Islands of the mid-Pacific, by Alfred J. Breslin and Melvin E. Cassidy. New York Operations Office. Health and Safety Lab., AEC. New York, N. Y. Jan 1955. Decl. with deletions Apr 1959. 75p. Order from LC. Mi $5.40, ph $15.30. NYO-4623(Del.)

Analysis of data obtained by Japanese scientists during the cruise of the Shunkotsu Maru, by Allyn C. Vine. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. and Woods Hole Oceanographic Institution. Mass. Mar 1955. Decl. Apr 1959. 28p. Order from LC. Mi $3.00, ph $6.30. NYO-4627

Sunshine report for January and February. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Apr 1955. Decl. Apr 1959. 24p. Order from LC. Mi $2.70, ph $4.80. NYO-4643

World-wide fallout from Operation Castle, by Robert J. List. Weather Bureau. Washington, D. C. May 1955. Decl. with deletions Apr 1959. 226p. Order from LC. Mi $10.20, ph $36.30. NYO-4645(Del. 2)

Sunshine report for March and April. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. May 1955. Decl. Apr 1959. 23p. Order from LC. Mi $2.70, ph $4.80. NYO-4646

Studies of factors in the uptake of Sr^{90}. Site survey-fall, 1954, by George A. Welford, comp. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Jun 1955. Decl. Jan 1957. 28p. Order from LC. Mi $2.70, ph $4.80. NYO-4649

Sunshine report for May and June. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Jul 1955. Decl. Apr 1959. 40p. Order from LC. Mi $3.00, ph $6.30. NYO-4653

Sunshine report for July and August, by James M. Fresco and others. New York Operations Office. Health and Safety Lab., AEC., New York, N. Y. Sep 1955. Decl. Apr 1959. 58p. Order from LC. Mi $3.60, ph $9.30. NYO-4661

Particulate air contamination at ORNL, by J. S. Cheka and H. J. McAlduff. Oak Ridge National Lab. Oak Ridge, Tenn. Jun 1949. Decl. Dec 1955. Contract W-7405-eng-26. 68p. Order from LC. Mi $4.50, ph $12.30. ORNL-283

Operation Plumbbob off-site radiological safety report, by O. R. Placak and others. Nevada Test Organization. Off-Site Radiological Safety Activities, AEC. 1957. 212p. Order from LC. Mi $9.60, ph $33.30. OTO-57-3

Climatological effect scaling winds for the United States, by B. N. Charles. Sandia Corp. Albuquerque, N. Mex. Feb 1958. Decl. Feb 1959. 53p. Order from LC. Mi $3.60, ph $9.30. SC-4152(TR)

Survey of fall-out of radioactive material following the Las Vegas, Nevada test explosions. New York Operations Office. Health and Safety Div., AEC., New York, N. Y. Feb 1951. Decl. Aug 1956. 36p. Order from LC. Mi $3.00, ph $6.30. TID-5035

A method of fallout prediction for tower bursts at the Nevada Test Site, by Kenneth M. Nagler and others. Weather Bureau. Washington, D. C. Jun 1955. Decl. Apr 1959. 51p. Order from LC. Mi $3.90, ph $10.80. TID-5489

The 1948 radiological and biological survey of areas in New Mexico affected by the first atomic bomb detonation. Part I and II, by Stafford L. Warren. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Oct 1949. Decl. Apr 1959. Contract AT-04-1-GEN-12. 99p. 2 illus. Order from LC. Mi $7.80, ph $25.80. UCLA-32

Alpha activity due to the 1945 atomic bomb detonation at Trinity, Alamogordo, New Mexico. Interim report, by K. H. Larson and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Jan 1951. Decl. Dec 1958. 44p. Order from LC. Mi $3.30, ph $7.80. UCLA-108

The 1949 and 1950 radiological soil survey of fission product contamination and some soil-plant interrelationships of areas in New Mexico affected by the first atomic bomb detonation, by K. H. Larson and others. Univ. of California. Atomic

Energy Project, Los Angeles, Calif. May 1951. Decl. Jan 1956. Contract AT-04-1-GEN-12. 83p. Order from LC. Mi $5.40, ph $15.30. UCLA-140

Field observations and preliminary field data obtained by the U.C.L.A. survey group on operation Jangle, November 1951, by K. H. Larson and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Jan 1952. Decl. Apr 1959. 28p. Order from LC. Mi $3.00, ph $6.30. UCLA-182

Preliminary study of off-site air-borne radioactive materials, Nevada Proving Grounds. I. Fall-out originating from Snapper 6, 7, and 8 at distances of ten to fifty miles from ground zero, by Jon H. Olafson and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Univ. of Rochester. Atomic Energy Project., Rochester, N. Y.; and Univ. of Washington. Seattle, Wash. Feb 1953. Decl. Apr 1959. Contract AT-04-1-GEN-12. 123p. 3 illus. Order from LC. Mi $8.40, ph $28.80. UCLA-243

Radiobiological resurvey of Bikini Atoll during the summer of 1947. Univ. of Washington. Applied Fisheries Lab., Seattle, Wash. 1947. Decl. Feb 1956. 62p. Order from LC. Mi $3.90, ph $10.80. UWFL-7

Concentration of active materials by hydroids in the Bikini Lagoon during the summer of 1947, by Lauren R. Donaldson and others. Univ. of Washington. Applied Fisheries Lab., Seattle, Wash. 1947. Decl. Mar 1957. Contract W-28-094-eng-33. 9p. Order from LC. Mi $1.80, ph $1.80. UWFL-11

Bikini radiobiological resurvey of 1948. Univ. of Wasington. Applied Fisheries Lab., Seattle, Wash. 1947. Decl. Mar 1957. Contract W-28-094-eng-33. 51p. Order from LC. Mi $3.60, ph $9.30. UWFL-16

Radiological analysis of biological samples collected at Eniwetok, May 16, 1948, by Lauren R. Donaldson and others. Univ. of Washington. Applied Fisheries Lab., Seattle, Wash. 1948. Decl. Mar 1957. Contract W-28-094-eng-33. 11p. Order from LC. Mi $1.80, ph $1.80. UWFL-18

Radiation levels in biological samples collected at Ponape, Caroline Islands, December 16-17, 1954, by Lauren R. Donaldson and others. Univ. of Washington. Applied Fisheries Lab., Seattle, Wash. Mar 1955. Contract AT(45-1)-540. 8p. Order from LC. Mi $1.80, ph $1.80. UWFL-40

Radiological safety; Operation Buster-Jangle, by Thomas L. Shipman. Los Alamos Scientific Lab. Los Alamos, N. Mex. Jul 1953. Decl. with deletions Apr 1955. 60p. Order from LC. Mi $3.90, ph $10.80. WT-425(Del.)

Activities of the special weather advisory service. Operation Tumbler-Snapper, by Clifford A. Spohn. Los Alamos Scientific Lab. Los Alamos, N. Mex. Nov 1952. Decl. Apr 1959. 59p. Order from LC. Mi $3.60, ph $9.30. WT-552

Report of the advisory personnel to the air-sampling program. Operation Tumbler-Snapper, by William S. Johnson and others. Los Alamos Scientific Lab. Los Alamos, N. Mex. Jun 1953. Decl. Apr 1959. 120p. Order from LC. Mi $6.00, ph $18.30. WT-566

Radiobiological studies at Eniwetok before and after Mike shot, by Lauren R. Donaldson. Univ. of Washington. Applied Fisheries Lab., Seattle, Wash. Jun 1953. Decl. Apr 1959. Project 11.5 of Operation Ivy. 98p. Order from LC. Mi $5.40, ph $15.30. WT-616

Fall-out gamma ray intensity, by Melvin P. Klein. Univ. of California. Radiation Lab., Livermore, Calif. Jan 1958. Project 5.3 of Operation Ivy. 13p. Order from LC. Mi $2.40, ph $3.30. WT-649

Comparison and evaluation of dosimetry methods applicable to gamma radiation, by George V. Taplin and others. Univ. of California. Atomic Energy Project., Los Angeles, Calif. Sep 1953. Decl. with deletions Apr 1959. 63p. Order from LC. Mi $3.90, ph $10.80. WT-802(Del.)

Distribution and characteristics of fall-out at distances greater than 10 miles from ground zero, March and April 1953, by Charles T. Rainey and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Feb 1954. Decl. Apr 1959. Project 27.1 of Operation Upshot-Knothole. 92p. Order from LC. Mi $5.40, ph $15.30. WT-811

Environmental and biological fate of fall-out from nuclear detonations in areas adjacent to the Nevada Proving Grounds, by Robert G. Lindberg and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Feb 1954. Decl. Apr 1959. Project 27.2 of Operation Upshot-Knothole. 49p. Order from LC. Mi $3.30, ph $7.80. WT-812

Effective energy of residual gamma radiation, by Adrian H. Dahl, et al. Univ. of Rochester. Atomic Energy Project, Rochester, N. Y. Jan 1954. Decl. Apr 1959. Project 29.4 of Operation Upshot-Knothole. 72p. Order from LC. Mi $3.90, ph $10.80. WT-814

Distribution and characterization of fall-out and airborne activity from 10 to 160 miles from ground zero, spring 1955, by L. Baurmash and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Sep 1958. Decl. Apr 1959. 122p. Order from LC. Mi $6.00, ph $18.30. WT-1178

Blast biology-a study of the primary and tertiary effects of blast in open undergound protective shelters, by D. R. Richmond and others. Lovelace Foundation for Medical Education and Research. Albuquerque, N. Mex. Feb 1959. Project 33.1 of Operation Plumbbob. 65p. Order from OTS. $1.75. WT-1467

Remote radiological monitoring, by S. C. Sigoloff and H. M. Borella. Division of Biology and Medicine. U.S. Atomic Energy Commission. Nov 1958. Project 39.9 of Operation Plumbbob. 84p. Order from OTS. $2.25. WT-1509

In vivo gamma counting method of determining uranium lung burden in humans, by R. E. Cofield. Union Carbide Corp. Union Carbide Nuclear Co. Y-12 Plant, Oak Ridge, Tenn. May 1959. Contract W-7405-eng-26. 33p. Order from OTS. $1.00. Y-1250

Instruments

Research and investigation leading to methods of generating and detecting radiation in the 100 to 1000 micron wavelength range of the spectrum. Quarterly progress report no. 11 for September 1, 1958 to December 1, 1958, by P. D. Coleman and others. Univ. of Illinois. Electrical Engineering Research Lab., Urbana, Ill. Mar 1959. Contract AT(11-1)-392. 95p. Order from LC. Mi $5.40, ph $15.30. AECU-4091

High resolution detection of radiation. Final report, by Henry J. Gomberg and others. Univ. of Michigan. Ann Arbor, Mich. Mar 1959. Project no. 3. Contract AT(11-1)-70. 47p. Order from LC. Mi $3.30, ph $7.80. AECU-4099

A high impedance input circuit using germanium transistors, by J. J. Baum. General Electric Co. Atomic Products Div., Aircraft Nuclear Propulsion Dept., Cincinnati, Ohio. Sep 1958. Contracts AF 33(600)-38062 and AT(11-1)-171. 15p. Order from OTS. 75 cents. APEX-501

Stability tests on the types IN430A and IN430B avalanche diode regulators, by J. L. Blankenship. Oak Ridge National Lab. Oak Ridge, Tenn. Dec 1958. Contract W-7405-eng-26. 11p. Order from LC. Mi $2.40, ph $3.30. CF-58-12-121

An in-line conductivity meter with temperature compensation, by Donald W. Colvin. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Apr 1959. Contract AT(07-2)-1. 12p. Order from OTS. 50 cents. DP-361

Neutron monitor for inaccessible locations, by Alwyn C. Lapsley. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Apr 1959. Contract AT(07-2)-1. 10p. Order from OTS. 50 cents. DP-362

Mass spectrometer filament assembly alignment gage, by J. Hallis. Goodyear Atomic Corp. Portsmouth, Ohio. Feb 1957. Contract AT (33-2)-1. 3p. Order from LC. Mi $1.80, ph $1.80. GAT-L-339

Operation and maintenance of the mouse counter, by D. A. Campbell and L. D. Test. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Nov 1955. Contract W-31-109-Eng-52. 13p. Order from LC. Mi $2.40, ph $3.30. HW-39837

Hanford special X-ray photometer-Mark II, by T. R. Cartmell, comp. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. N.D. Contract W-31-109-Eng-52. 29p. Order from LC. Mi $2.70, ph $4.80. HW-41681

Portable impact air sampler, by L. J. Defferding. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jan 1958. Contract W-31-109-Eng-52. 9p. Order from LC. Mi $1.80, ph $1.80. HW-54219

A filament furnace for high temperature microscopy, by H. W. Newkirk, Jr. and J. L. Bates. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 1959. Contract W-31-109-Eng-52. 13p. Order from OTS. 50 cents. HW-58302(Rev.)

A Nier type mass spectrometer of high sensitivity, by F. A. White and others. Appendix, by G. M. Roe. Knolls Atomic Power Lab. Schenectady, N. Y. Dec 1952. Decl. Jan 1959. Contract W-31-109-Eng-52. 87p. Order from LC. Mi $3.60, ph $9.30. KAPL-873

Lecture notes-random vibration, by R. M. Mains. Knolls Atomic Power Lab. Schenectady, N. Y. Jan 1959. Contract W-31-109-Eng-52. 18p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-RMM-4

Heat capacity of copper below 300°K, a test of two calorimeter designs, by Thomas A. Sandenaw. Univ. of California. Los Alamos Scientific Lab., Los Alamos, N. Mex. Mar 1959. Contract W-7405-ENG-36. 17p. Order from OTS. 75 cents. LA-2307

A liquid nitrogen liquid level controller. Publication no. 17, by Rodger Gamblin and others. Princeton Univ. Project Matterhorn, Princeton, N. J. Sep 1958. Contract AT(30-1)-1238. 10p. Order from LC. Mi $1.80, ph $1.80. NYO-2387

A simple method for generating the function $1/1-\cos\theta$, by Kurt Enslein. Univ. of Rochester. Rochester, N. Y. Apr 1956. Contract AT (30-1)-875. 15p. Order from LC. Mi $2.40, ph $3.30. NYO-7595

An infrared cell assembly for volatile solids, by George J. Janz and S. S. Danyluk. Rensselaer Polytechnic Inst. Troy, N. Y. Oct 1958. Contract AT(30-1)-1999. 9p. Order from LC. Mi $1.80, ph $1.80. NYO-8523

Instrumentation and controls division annual progress report for period ending July 1, 1958, by C. J. Borkowski and C. S. Harrill. Oak Ridge National Lab. Oak Ridge, Tenn. 1958. Contract W-7405-eng-26. 138p. Order from OTS. $2.75. ORNL-2647

Measurements through a hit cell window using optical tooling, by A. A. Abbatiello. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 12p. Order from LC. Mi $2.40, ph $3.30. ORNL-2658

Development of photomultiplier tubes. Supplementary report, by Jenny Bramley. DuMont (Allen B.) Labs, Inc. Tube Operations Div., Passaic, N. J. N.D. Contract AT(30-1)-1336. 21p. Order from LC. Mi $2.70, ph $4.80. RIB-39

Tube design and circuit considerations for fast-heating electronic systems, by K. D. Hardin. Sandia Corp. Albuquerque, N. Mex. Jun 1958. Contract AT-(29-1)-789. 20p. Order from LC. Mi $2.40, ph $3.30. SCR-17

Design of a 5-inch intermittent-flow high-temperature hypersonic wind tunnel, by Alan Pope and Randall C. Maydew. Sandia Corp. Albuquerque, N. Mex. May 1959. 36p. Order from OTS. $1.00. SCR-87

A mutual inductor for measurement of spark discharge surge currents, by J. M. Proud, Jr. Sandia Corp. Albuquerque, N. Mex. Jan 1959. Contract AT(29-1)-789. 18p. Order from LC. Mi $2.40, ph $3.30. SCTM-11-59(51)

Radio-frequency shielding of cables, by Charles W. Harrison, Jr. Sandia Corp. Albuquerque, N. Mex. Feb 1959. Contract AT(29-1)-789. 13p. Order from LC. Mi $2.40, ph $3.30. SCTM-45-59(14)

Automatic X-Y plotter, by Ralph Grill. Sandia Corp. Albuquerque, N. Mex. Apr 1959. Contract AT(29-1)-789. 16p. Order from LC. Mi $2.40, ph $3.30. SCTM-101-59(15)

The response characteristics of airplane and missile pressure measuring systems, by Harold Vaughn. Sandia Corp. Albuquerque, N. Mex. Aug 1954. Contract AT(29-1)-789. 20p. Order from LC. Mi $2.70, ph $4.80. SCTM-174-54(51)

Impedance of a T-antenna, by Charles W. Harrison, Jr. Sandia Corp. Albuquerque, N. Mex. Jul 1958. Contract AT(29-1)-789. 29p. Order from LC. Mi $2.70, ph $4.80. SCTM-257-58(14)

Transmission-line missile antennas, by Ronold W. P. King and others. Sandia Corp. Albuquerque, N. Mex. Nov 1958. Contract AT(29-1)-789. 23p. Order from LC. Mi $2.70, ph $4.80. SCTM-436-58(14)

Continuous radioactivity monitoring of the atmosphere at the Atomic Energy Project, University of California at Los Angeles. Part I. The period after the Nevada tests, by Leonard Baurmash and others. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Jul 1951. Decl. Mar 1957. Contract AT-04-1-GEN-12. 14p. Order from LC. Mi $2.40, ph $3.30. UCLA-145

Continuous radioactivity monitoring of the atmosphere at the Atomic Energy Project, University of California at Los Angeles. Part II. The period after the Greenhouse tests, by Leonard Baurmash and W. R. Kennedy. Univ. of California. Atomic Energy Project, Los Angeles, Calif. Oct 1951. Decl. Jan 1956. Contract AT-04-1-GEN-12. 9p. Order from LC. Mi $1.80, ph $1.80. UCLA-162

The high-temperature fission counter, by S. B. Gunst. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Sep 1955. Contract AT-11-1-GEN-14. 34p. Order from LC. Mi $3.00, ph $6.30. WAPD-PM-34

A rugged boron trifluoride proportional counter, by C. F. Swift and Robert T. Bayard. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Jul 1953. 15p. Order from LC. Mi $2.40, ph $3.30. WAPD-RM-190

Metallurgy and Ceramics

Preliminary study of the equilibrium of carbon and oxygen in columbium with carbon monoxide above 1600°C, by M. E. Sibert and M. A. Steinberg. Horizons, Inc. Cleveland, Ohio. 1958. Contract AT(30-1)-1894. 19p. Order from LC. Mi $2.40, ph $3.30. AECU-4023

Relations covering low cycle fatigue-a summary of the pertinent literature. Interim technical report no. 1, by G. Sachs and A. P. Taber. Syracuse Univ. Metallurgical Research Labs, Syracuse, N. Y. May 1958. Contract AT (30-1)-2141. 72p. Order from LC. Mi $4.50, ph $12.30. AECU-4040

Preferred orientation in thorium, by L. K. Jetter and C. J. McHargue. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. (M-6213). 42p. Order from LC. Mi $3.30, ph $7.80. AECU-4083

Investigation of the effects of fabrication variables on the corrosion resistance of zircaloy-2, by H. S. Kalish and others. Olin Mathieson Chemical Corp. Metallurgical Labs., New Haven, Conn. Mar 1959. Contract AT(36-1)-47. (NFR-59-3). 134p. Order from LC. Mi $6.90, ph $21.30. AECU-4093

Shielding on 30-inch pipe. Technical memorandum no. 10, by John J. Morabito. Atomic Power Development Associates, Inc. Detroit, Mich. Feb 1958. Contract AT(11-1)-476. 9p. Order from LC. Mi $2.40, ph $3.30. AECU-4095

Leakage from inert gas system. Technical memorandum no. 14, by W. W. Kendall and W. L. Chase. Atomic Power Development Associates, Inc. Detroit, Mich. Apr 1958. Contract AT(11-1)-476. 7p. Order from LC. Mi $1.80, ph $1.80. AECU-4097

Reactor building ventilation. Technical memorandum no. 15, by R. B. Shumaker. Atomic Power Development Associates, Inc. Detroit, Mich. Oct 1958. Addendum 1. Dec 1958. Contract AT(11-1)-476. 9p. Order from LC. Mi $2.70, ph $4.80. AECU-4098 & Add.

A correlation of the magnetic suseptibilities of thorium, uranium, and plutonium with crystal structure, by A. Allen Comstock. Los Alamos Scientific Lab. Los Alamos, N. Mex. Jul 1953. Decl. Feb 1959. Contract W-7405-eng-36. 37p. Order from LC. Mi $3.00, ph $6.30. AECD-4276

Recrystallization of heavily cold-rolled uranium sheet, by W. R. Yario and L. T. Lloyd. Argonne National Lab. Lemont, Ill. May 1959. Contract W-31-109-eng-38. Partial report - metallurgy program 4.1.5. 41p. Order from OTS. $1.25. ANL-5966

Rolling and welding type 430M tubes to stainless steel overlaid carbon steel tubesheets. SM-1 (APAR-1) research and development program. Task no. X, by R. W. Bennett and others. Alco Products, Inc. Schenectady, N. Y. Feb 1959. Contract AT(30-3)-326. 60p. Order from LC. Mi $3.60, ph $9.30. APAE-Memo-175

Studies of solid state reactions in high temperature alloy systems. First quarterly report for subcontract CAAT-17 nickel base alloy studies, by J. F. Radavich. General Electric Co. Atomic Products Div., Aircraft Nuclear Propulsion Dept., Cincinnati, Ohio. Oct 1958. Contracts AF 33(600)-38062 and AT(11-1)-171. 16p. Order from OTS. 50 cents. APEX-483

Materials for liquid metal systems, by William Holman. American-Standard. Atomic Energy Div., Redwood City, Calif. Oct 1957. 32p. Order from LC. Mi $3.00, ph $6.30. ASAE-26

Progress relating to civilian applications during December, 1958, by Russell W. Dayton and Clyde R. Tipton, Jr. Battelle Memorial Inst. Columbus, Ohio. Jan 1959. Decl. Jun 1959. Contract W-7405-eng-92. 68p. Order from OTS. $2.25. BMI-1307

Progress relating to civilian applications during January, 1959, by Russell W. Dayton and Clyde R. Tipton, Jr. Battelle Memorial Inst. Columbus, Ohio. Feb 1959. Decl. Jun 1959. Contract W-7405-eng-92. 77p. Order from OTS. $2.25. BMI-1315

Stabilization of UO_2 by valence compensation, by Wendell B. Wilson. Battelle Memorial Inst. Columbus, Ohio. Feb 1959. Contract W-7405-eng-92. 28p. Order from OTS. $1.00. BMI-1318

Coating of graphite with silicon carbide by reaction with vapor of controlled silicon activity, by John M. Blocher, Jr. and others. Battelle Memorial Inst. Columbus, Ohio. Jun 1959. Contract W-7405-eng-92. 17p. Order from OTS. 75 cents. BMI-1349

Effect of transfer time on the recrystallization behavior of beta-cooled uranium, by Q. C. Carloni and L. Lewis. Bridgeport Brass Co. Bridgeport, Conn. Jan 1959. 36p. Order from LC. Mi $3.00, ph $6.30. BRB-46

Thermal shock and fatigue test of a three inch pipe, by John A. Speeds. For Westinghouse Electric Corp. Atomic Power Div. Babcock and Wilcox Co. Research Center, Alliance, Ohio. Feb 1955. Subcontract 73-14-391. 24p. Order from LC. Mi $2.70, ph $4.80. BW-5425

Examination of Zr and Ti recombiner loop specimens, by P. L. Rittenhouse. Oak Ridge National Lab. Oak Ridge, Tenn. Dec 1958. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. CF-58-12-65

Hydrostatic journal bearing water tests conducted in modified PK-A pump, by H. E. Gilkey and P. G. Smith. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 17p. Order from LC. Mi $2.40, ph $3.30. CF-59-2-1

Interim report, flanging and flaring of zirconium and zircaloy-2 process tubing, by A. H. Hegge. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jun 1956. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $2.40, ph $3.30. HW-43831

Progress in the technique of roto arc welding, by J. C. Tverberg. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 1959. Contract W-31-109-Eng-52. 18p. Order from LC. Mi $2.40, ph $3.30. HW-49558

Experimental techniques for determing surface energies of solid metals-a literature survey, by J. J. Laidler. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jan 1959. 8p. Order from LC. Mi $1.80, ph $1.80. HW-58764

Roto-arc welding, by J. C. Tverberg. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 1959. Contract W-31-109-Eng-52. 26p. Order from OTS. 75 cents. HW-59134

Sintering studies on the system UO_2-PuO_2. Part I-solid solution formation, by T. D. Chikalla. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 1959. Contract W-31-109-Eng-52. 12p. Order from OTS. 50 cents. HW-60276

Semi-annual summary research report in metallurgy for January - June 1958. Iowa State College. Ames Lab., Ames, Iowa. Mar 1959. Contract W-7405-eng-82. 91p. Order from OTS. $2.25. ISC-1050

Creep of uranium, by Donald R. Saxton and Glenn Murphy. Ames Lab. Ames, Iowa. Jun Contract W-7405-eng-82. 38p. Order from LC. Mi $3.00, ph $6.30. ISC-1058

Tabulation, bibliography, and structure of binary intermetallic compounds. V. Compounds of aluminum and indium, by A. E. Ray and others. Iowa State College. Ames Lab., Ames, Iowa. Apr 1959. Contract W-7405-eng-82. 41p. Order from OTS. $1.25. ISC-1155

Graphitization in the power station at the Oak Ridge Gaseous Diffusion Plant, by C. H. Mahoney and W. S. Dritt. Oak Ridge Gaseous Diffusion Plant. Oak Ridge, Tenn. Nov 1958. Contract W-7405-eng-26. 40p. Order from LC. Mi $3.00, ph $6.30. K-1404

Evaluation of the tungsten-inert gas-arc welding process for joining type 6061T-6 aluminum tubing, by D B. Kittle. Knolls Atomic Power Lab. Schenectady, N. Y. Aug 1958. Contract W-31-109-Eng-52. 16p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-DBK-5

Development of iron-aluminum base alloy for gas cooled reactor components. Final report. Martin Nuclear Co. Baltimore, Md. Apr 1959. Contract AT(30-3)-325. 146p. Order from OTS. $2.75. MND-DB-2525

Zero power test manufacturing report. Martin Co. Nuclear Div., Baltimore, Md. Dec 1958. Contract AT(30-3)-277. 37p. Order from LC. Mi $3.00, ph $6.30. MND-MPR-1580

Uranium alloy development program for OMR, by W. H. Friske and others. North American Aviation, Inc. Atomics International, Canoga Park, Calif. May 1959. Contract AT(11-1)-GEN-8. 51p. Order from OTS. $1.50. NAA-SR-3169

A new SRE fuel slug preliminary design for higher total reactor power, by B. R. Hayward. North American Aviation, Inc. Downey, Calif. Mar 1954. Decl. Nov 1958. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-915

Effect of molten sodium on thermal insulation specimens, by M. Tarpinian. North American Aviation, Inc. Downey, Calif. Nov 1954. 8p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-1171

Core tank galling tests, by Ernest Phillips. North American Aviation, Inc. Downey, Calif. Jan 1956. 11p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1559

Summary report "project freeze seal," by Roman Cygan. North American Aviation, Inc. Downey, Calif. Jan 1956. 20p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1565

The physics of refractory materials: I. Transition metals, by John E. Hove. North American Aviation, Inc. Atomics International Div., Canoga Park, Calif. Oct 1956. 23p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-1752

Redistribution of a solute species under a temperature gradient in a binary alloy, by A. W. Sommer. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jan 1959. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3463

Metallurgical aspects of the corrosion resistance or zirconium, by David S. Kneppel. Nuclear Metals, Inc. Cambridge, Mass. Aug 1955. 24p. Order from LC. Mi $2.70, ph $4.80. NMI-1136

Quarterly progress report to the AEC research division for the period October 1, 1958 through December 31, 1958, by S. H. Gelles and others. Nuclear Metals, Inc. Concord, Mass. Feb 1959. Contract AT(30-1)-1565. 25p. Order from LC. Mi $2.70, ph $4.80. NMI-1211

Third-dimensional ductility and crack propagation in beryllium sheet, by F. M. Yans. Nuclear Metals, Inc. Concord, Mass. Mar 1959. Contract AT(30-1)-1565. 36p. Order from LC. Mi $3.00, ph $6.30. NMI-1212

Diffusion of oxygen in hafnium, by J. Paul Pemsler. Nuclear Metals, Inc. Concord, Mass. Apr 1959. Contract AT(30-1)-1565. 7p. Order from LC. Mi $1.80, ph $1.80. NMI-1213

Versatile stressing device for small specimens, by E. J. Rapperport and S. H. Gelles. Nuclear Metals, Inc. Concord, Mass. Apr 1959. Contract AT(30-1)-1565. 9p. Order from LC. Mi $1.80, ph $1.80. NMI-1214

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period July 20, 1957 through August 20, 1957, by A. M. White and others. Nuclear Metals, Inc. Cambridge, Mass. Sep 1957. Contract AT(30-1)-1565. 8p. Order from LC. Mi $1.80, ph $1.80. NMI-4353

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period July 6, 1958 through July 31, 1958, by F. S. Gardner and others. Nuclear Metals, Inc. Concord, Mass. Oct 1958. Contract AT(30-1)-1575, sponsor agreement no. S-31. 15p. Order from LC. Mi $2.40, ph $3.30. NMI-4368

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period August 1, 1958 through August 31, 1958, by F. S. Gardner and others. Nuclear Metals, Inc. Concord, Mass. Nov 1958. Contract AT(30-1)-1565, sponsor agreement no. S-31. 20p. Order from LC. Mi $2.40, ph $3.30. NMI-4369

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period September 1, 1958 through September 30, 1958, by F. S. Gardner and others. Nuclear Metals, Inc. Concord, Mass. Feb 1959. Contract AT(30-1)-1565, sponsor agreement no. S-31. 13p. Order from LC. Mi $2.40, ph $3.30. NMI-4381

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period October 1, 1958 through October 31, 1958, by F. S. Gardner and others. Nuclear Metals, Inc. Concord, Mass. Feb 1959. Contract AT(30-1)-1565, sponsor agreement no. S-31. 18p. Order from LC. Mi $2.40, ph $3.30. NMI-4382

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period January 1, 1959 through January 31, 1959, by F. S. Gardner and others. Nuclear Metals, Inc. Concord, Mass. Feb 1959. Contract AT (30-1)-1565, sponsor agreement no. S-31. 35p. Order from LC. Mi $3.00, ph $6.30. NMI-4385

Materials properties research required for the rational design of pressure vessels in nuclear reactors. Final report, by L. U. Rastrelli. Southwest Research Inst. San Antonio, Tex. Dec 1958. Project no. 774-12. Contract AT(30-1)-2146. 103p. Order from LC. Mi $7.50, ph $24.30. NYO-2325

Liquid metal loops irradiated in the ORNL graphite reactor and the LITR, by W. W. Parkinson and O. Sisman. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 36p. Order from OTS. $1.25. ORNL-2630

The immersed ultrasonic inspection of metal plate, by R. W. McClung. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 22p. Order from LC. Mi $2.70, ph $4.80. ORNL-2650

Implications of ultrasonic attenuation to nondestructive testing, by J. K. White and others. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 17p. Order from LC. Mi $2.40, ph $3.30. ORNL-2651

Eddy-current testing in practice, by John W. Allen. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 57p. Order from LC. Mi $3.60, ph $9.30. ORNL-2655

Technical papers of the eleventh metallographic group meeting heald at Bridgeport Brass Company, by H. P. Roth. Nuclear Metals, Inc. Concord, Mass. Nov 1956. 109p. Order from OTS. $2.50. TID-7567(Pt. 1)

Development of boron-bearing materials for pressurized water reactor (PWR) control rods, by E. F. Losco and H. J. Snyder. Westinghouse Electric Corp. Bettis Atomic Power Div., Pittsburgh, Pa. Jan 1958. 60p. Order from LC. Mi $3.60, ph $9.30. WAPD-PWR-PMM-1806

Alternate control rod materials silver-base alloys. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. 1958. 11p. Order from LC. Mi $2.40, ph $3.30. WAPD-PWR-PMM-2760

Preparation of cheap alternate feed material for the manufacture of zirconium crystal bar, by H. R. Hoge and Z. M. Shapiro. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Mar 1952. Decl. Jul 1957. 20p. Order from LC. Mi $2.40, ph $3.30. WAPD-TD-51

Laboratory method for adjusting hydrogen content of zirconium, by John J. Kearns. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. May 1958. Contract AT-11-1-Gen-14. 55p. Order from LC. Mi $3.60, ph $9.30. WAPD-TM-147

Zirconium highlights. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Dec 1958. Contract AT-11-1-GEN-14. 29p. Order from LC. Mi $2.70, ph $4.80. WAPD-ZH-13

Zirconium highlights. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Jan 1959. Contract AT-11-1-GEN-14. 25p. Order from LC. Mi $2.70, ph $4.80. WAPD-ZH-14

Particle Accelerators and High-Voltage Machines

Abstract bibliography of linear accelerators (December 1928 to December 1957); (excluding Van de Graaff generators and Cockcroft-Walton accelerators), by Carol Malmberg, comp. Los Alamos Scientific Lab. Los Alamos, N. Mex. Mar 1958. Contract W-7405-eng-26. (D-BIB-22). 84p. Order from LC. Mi $3.30, ph $7.80. AECU-4009

Abstract bibliography on traveling wave linear accelerators (January 1946 to December 1957), by Carol Malmberg, comp. Los Alamos Scientific Lab. Los Alamos, N. Mex. Apr 1958. Contract W-7405-eng-36. (D-BIB-23). 29p. Order from LC. Mi $2.40, ph $3.30. AECU-4010

Minutes of the cyclotron shielding meeting held at the Oak Ridge National Laboratory on December 18, 1958. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1959. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-59-1-6

Concerning the ν/N 1/3 resonance, I application of a variational procedure and of the Moser method to the equation $\frac{d^2v}{dt^2} + \frac{2\nu}{N}^2 v + \frac{1}{2} (\sin 2t)\ v^2 = 0$, by L. Jackson Laslett. Midwestern Universities Research Association. Madison, Wisc. Apr 1959. Contract AT(11-1)-384. 43p. Order from OTS. $1.25. MURA-452

A summary of the linear orbit properties of an accelerator having a general magnetic field, by George Parzen. Midwestern Universtities Research Association. Madison, Wisc. Apr 1959. Contract AT(11-1)-384. 8p. Order from OTS. 50 cents. MURA-454

Concerning the $\nu/N \to 1/3$ resonance, II application of a variational procedure and of the Moser method to the equation

$$\frac{d^2v}{dt^2} + \left(\frac{2\nu}{N}\right)^2 v + \frac{1}{2}\left[\sum_{m=1} b_m \sin 2mt\right] v^2 = 0,$$

by L. Jackson Laslett. Midwestern Universities Research Association. Madison, Wisc. May 1959. Contract AT(11-1)-384. 22p. Order from OTS. 75 cents. MURA-459

Power-supply system for the Bevatron auxiliary magnets, by C. A. Harris. Univ. of California. Lawrence Radiation Lab., Berkeley, Calif. May 1959. Contract W-7405-eng-48. 26p. Order from CTS. 75 cents. UCRL-8616

Physics and Mathematics

The S_n method and the SNG and SNK codes, by Bengt G. Carlson. Los Alamos Scientific Lab. Los Alamos, N. Mex. Jan 1958. Contract W-7405-eng-36. 63p. Order from LC. Mi $3.90, ph $10.80. AECU-3691

Extension of the method of burnout prediction, by Louis Bernath. Du Pont de Nemours (E. I) & Co. Explosives Dept., Wilmington, Del. 1958. 10p. Order from LC. Mi $1.80, ph $1.80. AECU-3901

The diffuse X-ray scattering in powder patterns arising from static displacements in cubic solid solutions, by C. R. Houska and B. L. Averbach. Massachusetts Inst. of Tech. Dept. of Metallurgy, Cambridge, Mass. 1958? 15p. Order from LC. Mi $2.40, ph $3.30. AECU-4019

Velocity and temperature distributions about a horizontal cylinder in free convection heat transfer. Final report, by Alexander Sesonske. Purdue Univ. Lafayette, Ind. Sep 1958. Contract AT(11-1)-432. (PRF-1425). 18p. Order from LC. Mi $2.40, ph $3.30. AECU-4022

A set of basic circuits. Report no. 86, by Gene H. Leichner. Univ. of Illinois. Digital Computer Lab., Urbana, Ill. Oct 1958. Contract AT (11-1)-415. 38p. Order from LC. Mi $3.00, ph $6.30. AECU-4032

Flow-gating I. Report 83, by W. J. Poppelbaum. Univ. of Illinois. Digital Computer Lab., Urbana, Ill. Jul 1958. Contract AT(11-1)-415. 15p. Order from LC. Mi $2.40, ph $3.30. AECU-4033

Low-energy π-mesons in the cosmic radiation. Cosmic rays technical report no. 41, by Mircea Fotino. Univ. of California. Berkeley, Calif. Feb 1959. Sponsored by ONR and AEC under contract Nonr-222(40). 50p. Order from LC. Mi $3.30, ph $7.80. AECU-4034

Dispersion of fluid flow in porous media, by A. Ogata and R. B. Banks. Northwestern Univ. Technological Inst., Evanston, Ill. Jan 1959. Contract AT(11-1)-353. 71p. Order from LC. Mi $3.90, ph $10.80. AECU-4036

Department of chemical engineering progress report for September 1, 1957 through June 30, 1958. Part I. Thermal conductivity of deuterium oxide, by B. L. Baker and S. T. Goforth, Jr. Univ. of South Carolina. Columbia, S. C. 1958. Contract AT(38-1)-118. 27p. Order from LC. Mi $2.70, ph $4.80. AECU-4043

Cross sections of the fission U^{235} induced by intermediated energy helium ions (thesis), by Raymond Gunnink. Purdue Univ. Lafayette, Ind. Feb 1959. Contract AT(11-1)-347. 182p. Order from LC. Mi $8.40, ph $28.80. AECU-4044

The dielectric tube resonator-a slow-wave, open boundary, dielectric resonator for the generation and measurement of millimeter and submillimeter wavelength electromagnetic radiation. Technical report no. 2, by R. C. Becker. Univ. of Illinois. Engineering Experiment Station, Urbana, Ill. Jan 1959. Contract AT(11-1)-392. 346p. Order from LC. Mi $11.10, ph $53.10. AECU-4045

Gamma decay of the μ-meson, by M. E. Ebel and F. J. Ernst. Univ. of Wisconsin. Madison, Wisc. 1959. Contract AT(11-1)-30. 9p. Order from LC. Mi $1.80, ph $1.80. AECU-4080

Isotopic sources of secondary radiation. Interim technical report covering the period from June 15, 1958 to March 1, 1959, by Louis Voyvodic and C. A. Stone. Illinois Inst. of Tech. Armour Research Foundation, Chicago, Ill. Mar 1959. Contract AT(11-1)-657. 52p. Order from LC. Mi $3.60, ph $9.30. AECU-4085

A boiling water analysis code on the IBM-650-ABWAC-MNC program no. 302, by I. Beretsky and S. Pacine. Alco Products, Inc. Schenectady, N. Y. Mar 1959. Contract AT(30-3)-326. 27p. Order from LC. Mi $2.70, ph $4.80. APAE-Memo-181

ATBAC check calculation on the IBM 650. Program no. 303, by I. Beretsky and P. V. Oby. Alco Products, Inc. Schenectady, N. Y. Mar 1959. Contract AT(30-3)-326. 14p. Order from LC. Mi $2.40, ph $3.30. APAE-Memo-183

On an integral equation occurring in the study of a folded flow, by J. F. Heyda. General Electric Co. Aircraft Nuclear Propulsion Dept., Cincinnati, Ohio. Jan 1959. (XDC-59-1-257). 13p. Order from LC. Mi $2.40, ph $3.30. APEX-472

Some relativistic two-body kinematics tables, by L. B. Keipuner. Brookhaven National Lab. Upton, N. Y. Aug 1958. 312p. Order from OTS. $5.00. BNL-513(T-125)

A spherical shell loaded along a latitude circle, by B. L. Greenstreet. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1958. Contract W-7405-eng-26. 20p. Order from LC. Mi $2.40, ph $3.30. CF-58-2-14

Study of gamma rays produced by neutron interactions in air, by V. R. Cain and others. Oak Ridge National Lab. Oak Ridge, Tenn. May 1958. Contract W-7405-eng-26. 27p. Order from LC. Mi $2.70, ph $4.80. CF-58-4-77

Analysis of tapered circular plates, by F. J. Stanek. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 50p. Order from LC. Mi $3.30, ph $7.80. CF-58-7-9

SOL: an oracle code for the solution of certain second order linear partial differential equations, by F. J. Witt. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 17p. Order from LC. Mi $2.40, ph $3.30. CF-58-10-14

Recent advances in gas absorption apparatus in Russia, by J. T. Long. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-Eng-26. 34p. Order from LC. Mi $2.70, ph $4.80. CF-58-11-77

Thermal stress analysis of cylindrical shells, by F. J. Witt. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 29p. Order from LC. Mi $2.70, ph $4.80. CF-59-1-33(Rev.)

Cross section program at ORNL, by J. A. Harvey and J. L. Fowler. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-59-2-83

The details of the equipment and the experimental procedure used for scattering experiments performed at the Brookhaven National Laboratory 60-inch cyclotron, by Vera K. Fischer. Columbia Univ. Pupin Cyclotron Lab. and George B. Pegram Lab., New York, N. Y. Mar 1959. Contract AT-30-1-GEN-72. 29p. Order from LC. Mi $2.70, ph $4.80. CU-170

Elastic scattering of alpha particles by 0^{16}, by Lillian Christie McDermott. Columbia Univ. Pupin Cyclotron Lab. and George B. Pegram Lab., New York, N. Y. Apr 1959. Contract AT(30-1)-Gen-72. 103p. Order from OTS. $2.50. CU-187

Temperature distribution in fuel elements, by G. Robert Hoke and Samuel Mirshak. E. I. du Pont de Nemours & Co. Explosives Dept. - Atomic Energy Div., Technical Div. - Savannah River Lab., Aiken, S. C. Apr 1959. Contract AT(07-2)-1. 24p. Order from OTS. 75 cents. DP-359

A summary of small source theory applied to thermal reactors, by W. A. Horning. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Dec 1954. Decl. Jul 1955. Contract W-31-109-Eng-52. 38p. Order from LC. Mi $3.00, ph $6.30. HW-34021

Simulation of an electromagnetic nondestructive test on an analog computer, by W. D. Cameron. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Mar 1959. Contract W-31-109-Eng-52. 14p. Order from LC. Mi $2.40, ph $3.30. HW-59546

Semi-annual summary research report in physics for July-December 1958. Iowa State College. Ames Lab., Ames, Iowa. Apr 1959. Contract W-7405-eng-82. 33p. Order from OTS. $1.00. ISC-1115

Preliminary summary report of strong-motion measurements from a confined underground nuclear detonation, by William R. Perret and Roger G. Preston. Univ. of California. Radiation Lab., Livermore, Calif. Jun 1958.

Operation Plumbbob preliminary report. Program 26. 34p. Order from OTS. $1.00. ITR-1499

Surface motion from an underground detonation, by L. M. Swift and others. Stanford Research Inst. Menlo Park, Calif. Oct 1957. Operation Plumbbob preliminary report. Project 26.4a. 72p. Order from OTS. $1.75. ITR-1528

Subsurface motion from a confined underground detonation-part I, by William R. Perret. Sandia Corp. Albuquerque, N. Mex. Oct 1957. Operation Plumbbob interim report. Project 26.4b. 59p. Order from OTS. $1.75. ITR-1529

A new apparatus for liquid phase thermal diffusion, by Edward Von Halle. Union Carbide Corp. Union Carbide Nuclear Co., Oak Ridge Gaseous Plant, Oak Ridge, Tenn. Jun 1959. Contract W-7405-eng-26. 363p. Order from OTS. $5.00. K-1420

CUREBO: A generalized two-space-dimensional coding with cross section and depletion calculations for the IBM 704, by J. A. Archibald, Jr. General Electric Co. Knolls Atomic Power Lab., Schenectady, N. Y. Apr 1959. Contract W-31-109-Eng-52. 112p. Order from OTS. $2.75. KAPL-1885

An approximate confidence interval for two-sided proportion defective in variables sampling, by Max Halperin. General Electric Co. Knolls Atomic Power Lab., Schenectady, N. Y. Jul 1958. Contract W-31-109-Eng-52. 12p. Order from OTS. 75 cents. KAPL-1960

TIGER II: An IBM-704 digital computer program-temperatures from internal generation rates, by A. P. Bray and S. J. MacCracken. Knolls Atomic Power Lab. Schenectady, N. Y. Feb 1959. Contract W-31-109-Eng-52. 61p. Order from LC. Mi $3.90, ph $10.80. KAPL-M-D1G-TD-9

Depletion schemes for three-group diffusion theory codes, by R. C. Dahlberg and F. D. Judge. Knolls Atomic Power Lab. Schenectady, N. Y. Feb 1959. Contract W-31-109-Eng-52. 20p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-FDJ-12

Application of digital computers to the analysis of radioactive transport problems, by G. H. Epstein. Knolls Atomic Power Lab. Schenectady, N. Y. Nov 1958. Contract W-31-109-Eng-52. 34p. Order from LC. Mi $3.00, ph $6.30. KAPL-M-GHE-2

Statistical procedures for controlling and assuring fuel plate properties that can be measured only by destroying the plates, by G. L. Burrows. Knolls Atomic Power Lab., Schenectady, N. Y. Nov 1958. Contract W-31-109-Eng-52. 24p. Order from LC. Mi $3.00, ph $6.30. KAPL-M-GLB-1

Use of rare earths as neutron absorbers, by I. Bornstein. Knolls Atomic Power Lab, Schenectady, N. Y. Jan 1953. Decl. Feb 1959. Contract W-31-109-Eng-52. 22p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-IB-10

A simplified method of calculating beta dose rates, by Robert J. Mazairs. Knolls Atomic Power Lab. Schenectady, N. Y. Mar 1959. Contract W-31-109-Eng-52. 24p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-RJM-3

Neutron scattering by U^{235}, Pu^{239}, and U^{238}, by Lawrence Cranberg. Appendix II, by Jules S. Levin. Univ. of California. Los Alamos Scientific Lab., Los Alamos, N. Mex. Jun 1959. Contract W-7405-ENG-36. 51p. Order from OTS. $1.50. LA-2177

Concerning the $2\nu/N \longrightarrow 1/3$ resonance, III. Use of the Moser method to estimate the rotation number, as a function of amplitude, for the equation

$$\frac{d^2v}{dt^2}+\left(\frac{2\nu}{N}\right)^2 v+\frac{1}{2}\ (\sin 2t)\ v^2=0,$$

by L. Jackson Laslett. Midwestern Universities Research Association. Madison, Wisc. May 1959. Contract AT(11-1)-384. 17p. Order from OTS. 50 cents. MURA-461

A method for determining the equilibrium distribution of electrons and their total free energy in a multivalent metal, by G. W. Lehman. North American Aviation, Inc. Downey, Calif. Apr 1956. 6p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-1343

Point value cross sections for the materials H Li^6, Be, B, C, F, Na, K. Cr, Fe, Ni, Zr, Gd, W, and Pb, by C. W. Monroe and others. For Pratt and Whitney Aircraft Div. Nuclear Development Corp. of America. White Plains, N. Y. Sep 1956. 72p. Order from LC. Mi $5.40, ph $15.30. NDA-57-27

Cross-section and proton polarization in the photodisintegration of the deuteron, by W. Zernik and others. Yale Univ. New Haven, Conn. Jan 1959. Contract AT(30-1)-1807. 12p. Order from LC. Mi $2.40, ph $3.30. NYO-2150

On the inversion of certain matrices, by Samuel Schechter. New York Univ. Atomic Energy Commission Computing and Applied Mathematics Center, New York, N. Y. Feb 1959. Contract AT(30-1)-1480. 17p. Order from LC. Mi $2.40, ph $3.30. NYO-2539

Production of high magnetic fields. Technical memorandum no. 30, by Donald R. Wells. Princeton Univ. Project Matterhorn, Princeton, N. J. Sep 1956. 75p. Order from LC. Mi $4.50, ph $12.30. NYO-6375

Magneto-hydrodynamic shock structure using friction, by Cathleen S. Morawetz. New York Univ. Atomic Energy Commission Computing and Applied Mathematics Center, New York, N. Y. Jan 1959. Contract AT(30-1)-1480. 24p. Order from LC. Mi $2.70, ph $4.80. NYO-8677

Ultrahigh vacuum techniques. Quarterly progress report for November 1, 1958-January 31, 1959. Research report 403FF312-R5. Westinghouse Electric Corp. Research Labs., Pittsburgh, Pa. Feb 1959. Contract AT(30-1)-2176. 12p. Order from LC. Mi $2.40, ph $3.30. NYO-8705

Theory of resonance absorption of neutrons in a lump, by Kazu Hasegawa. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 35p. Order from OTS. $1.25. ORNL-2705

Physics division annual progress report for period ending March 10, 1959, by J. L. Fowler and E. O. Wollan. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 87p. Order from OTS. $2.25. ORNL-2718

A study of cavity ionization as a function of atomic number by use of a miniature counter, by W. D. Dillow and others. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 66p. Order from OTS. $1.75. ORNL-2724

Electronuclear research division annual progress report for period ending October 1, 1958, by Robert S. Livingston. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 47p. Order from OTS. $1.50. ORNL-2740

Nuclear chemistry research. Annual progress report. Dept. of Chemistry, by R. W. Fink and Arthur Fry. Univ. of Arkansas. Fayetteville, Ark. Jan 1959. Contract AT(40-1)-277. 132p. Order from LC. Mi $6.90, ph $21.30. ORO-182

A study comparing winds aloft measuring equipment at Salton Sea test base, by L. B. Smith, 5241-4. Sandia Corp. Albuquerque, N. Mex. Nov 1954. 11p. Order from OTS. 50 cents. SC-3512(TR)

A method for obtaining the variance of averages over non-independent samples from a stationary time series, by Peter D. Welch. For Sandia Corp. New Mexico Coll. of Agriculture and Mechanic Arts. Physical Science Lab., State College, N. Mex. Dec 1955. Changed from Official Use Only Feb 1959. 15p. Order from LC. Mi $2.40, ph $3.30. SCDC-802

Stress-strain characteristics of materials at high strain rates. Part III. Strain rate effects and Plastic wave propagation, by James W. Turnbow. For Sandia Corp. Univ. of Texas. Structural Mechanics Research Lab., Austin, Tex. Jan 1959. Contract AT(29-2)-621. 187p. Order from LC. Mi $8.40, ph $28.80. SCDC-813

Solar sailing, by Dr. Theodore P. Cotter. Sandia Corp. Research Colloquium, Albuquerque, N. Mex. Apr 1959. 17p. Order from OTS. 75 cents. SCR-78

Positional tolerancing at Sandia Corporation. Sandia Corp. Albuquerque, N. Mex. May 1959. 35p. Order from OTS. $1.00. SCR-83

Body and fin loads on a high-fineness-ratio body and body-fin combination through the Mach range from 0.3 to 1.2 at angles of attack up through 40 degrees, by Roger E. Tate. Sandia Corp. Albuquerque, N. Mex. Feb 1959. Contract AT(29-1)-789. 309p. Order from LC. Mi $11.10, ph $48.60. SCTM-32-59(51)

Air pressure versus depth of burst, by B. F. Murphey and E. S. Ames. Sandia Corp. Albuquerque, N. Mex. Feb 1959. 4p. Order from LC. Mi $1.80, ph $1.80. SCTM-42-59(51)

Extension of a definition of constancy to noncircular normal distributions, by C. E. Abraham and W. H. Bradford. Sandia Corp. Albuquerque, N. Mex. Mar 1959. Contract AT(29-1)-789. 56p. Order from LC. Mi $3.60, ph $9.30. SCTM-54-59(51)

Craters formed over a concrete stratum, by I. N. Schofield and L. J. Vortman. Sandia Corp. Albuquerque, N. Mex. Mar 1959. 15p. Order from LC. Mi $2.40, ph $3.30. SCTM-61-59(51)

Summary report uf UNM studies of accuracy in calculating arithmetical problems, by P. F. Meigs - 1291. Sandia Corp. Albuquerque, N. Mex. May 1957. Contract -(29-1)-789. Case no. 418.04. 12p. Order from OTS. 50 cents. SCTM-114-57-12

Crater studies desert alluvium, by B. F. Murphey, 5112 and H. R. MacDougall, 5232. Sandia Corp. Albuquerque, N. Mex. May 1959. Case 793.60. 14p. Order from OTS. 50 cents. SCTM-119-59(51)

Curves for estimating low blast overpressure, by L. J. Vortman, 5112. Sandia Corp. Albuquerque, N. Mex. Apr 1958. Case no. 407.01. 5p. Order from OTS. 50 cents. SCTM-195-58(51)

Summaries of physical research in physics and mathematics. Atomic Energy Commission. Physics and Mathematics Branch, Div. of Research, Washington, D. C. May 1959. 102p. Order from OTS. $1.00. TID-4005(Pts. 3 & 4)

2200 m/sec cross section of U-235, by Max L. Yeater. Knolls Atomic Power Lab. Schenectady, N. Y. Oct 1957. 4p. Order from LC. Mi $1.80, ph $1.80. TNCC(US)-36A

Reports bearing on U^{235} thermal fission cross-section discrepancy. Tripartite Nuclear Cross-Sections Committee. Mar 1958. 28p. Order from LC. Mi $2.70, ph $4.80. TNCC(US)-39

Energy transfer between modified Maxwell distributions, by Howard D. Greyber. Univ. of California. Radiation Lab., Livermore, Calif. Sep 1956. Decl. Nov 1958. Contract W-7405-eng-48. 17p. Order from LC. Mi $2.40, ph $3.30. UCRL-4766

Results of beam inflection tests, by William I. Linlor. Univ. of California. Radiation Lab., Livermore, Calif. Apr 1957. Decl. Nov 1958. Contract W-7405-eng-48. 32p. Order from LC. Mi $2.70, ph $4.80. UCRL-4881

UCRL orbit program. Progress report no. 2: June 1958, by Richard Levee and Joseph L. Brady. Univ. of California. Radiation Lab., Livermore, Calif. Jul 1958. Contract W-7405-eng-48. 12p. Order from LC. Mi $2.40, ph $3.30. UCRL-5288-T

Decay modes of charged Σ hyperons, by W. H. Barkas and others. Univ. of California. Radiation Lab., Berkeley, Calif. Jun 1958. Contract W-7405-eng-48. 3p. Order from LC. Mi $1.80, ph $1.80. UCRL-8372

Some nuclear properties of Bi^{206}, Ti^{200}, Ti^{201}, Ti^{202}, In^{109}, In^{110m}, and In^{111}. The nuclear spins of Bi^{206}, Ti^{200}, Ti^{201}, and Ti^{202}. The nuclear spins, magnetic dipole, and electric quadrupole interaction constants of In^{109}, In^{110m} and In^{111} (thesis), by Lawrence Louis Marino. Univ. of California. Lawrence Radiation Lab., Berkeley, Calif. Apr 1959. Contract W-7405-eng-48. 132p. Order from OTS. $2.75. UCRL-8721

Angular distributions in Σ^+ decay, by Jack Leitner and others. Univ. of California. Lawrence Radiation Lab., Berkeley, Calif. Apr 1959. Contract W-7405-eng-48. 10p. Order from OTS. 50 cents. UCRL-8737

Mixing in rectangular nuclear reactor channels. Adopted from the thesis: Mass transfer by eddy diffusion in the wide direction of a rectangular channel, by R. J. Slember. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Jan 1958. 58p. Order from LC. Mi $3.60, ph $9.30. WAPD-T-653

Photographic analysis of earth motion, shot Rainier. Edgerton, Germeshausen & Grier, Inc. Boston, Mass. and Las Vegas, Nev. May 1958. Operation Plumbbob. Project 26.4f. 11p. Order from OTS. 50 cents. WT-1532

Progress Reports

Progress report . Nuclear engineering department. July 1 - September 30, 1958, by F. Maslan. Brookhaven National Lab. Upton, N. Y. 1958. 76p. Order from OTS. $2.25. BNL-536(S-47)

Radiation Effects on Materials

Neutron irradiation effects in a copper-aluminum alloy, by C. R. Houska and B. L. Averbach. Massachusetts Inst. of Tech. Dept. of Metallurgy, Cambridge, Mass. 1958? 27p. Order from LC. Mi $2.70, ph $4.80. AECU-4018

Radiation stability of organic liquids. Semi-annual report no. 1 for January 1 to June 30, 1957, by R. M. Wagner and others. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Sep 1957. SRI project no. SD-2080-1. Contract W-7405-eng-26, subcontract

1081. 16p. Order from LC. Mi $2.40, ph $3.30. AECU-4051

Radiation stability of organic liquids. Semi-annual report no. 2 for July 1 to December 31, 1957, by R. M. Wagner. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Jan 1958. SRI project no. SD-2080-1. Contract W-7405-eng-26, subcontract 1081. 29p. Order from LC. Mi $2.70, ph $4.80. AECU-4052

Radiation stability of organic liquids. Semi-annual report no. 3 for January 1 to June 30, 1958, by R. M. Wagner and L. H. Towle. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Jun 1958. SRI project no. SD-2080-1. Contract W-7405-eng-26, subcontract 1081. 41p. Order from LC. Mi $3.00, ph $6.30. AECU-4053

Radiation stability of organic liquids. Semi-annual report no. 4 for July 1 to December 31, 1958, by R. M. Wagner and L. H. Towle. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Jan 1959. SRI project no. SD-2080-1. Contract W-7405-eng-26, subcontract 1081. 47p. Order from LC. Mi $3.30, ph $7.80. AECU-4054

Radiation chemistry of organic substances. Final report for January 1, 1957 to January 31, 1959, by James A. Knight, Jr. For Oak Ridge National Lab. Georgia Inst. of Tech. Engineering Experiments Station, Atlanta, Ga. Jan 1959. Project no. A-323. Contract W-7405-eng-26, subcontract 1082. 39p. Order from LC. Mi $3.00, ph $6.30. AECU-4056

High temperature radiation induced graphite contraction, by J. M. Davidson and others. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Feb 1959. Contract W-31-109-Eng-52. 14p. Order from LC. Mi $2.40, ph $3.30. HW-57900(Rev.)

An experiment to determine the radiation stability of boron trifluoride and its corrosion of various metals under neutron irradiation, by Warren K. McCarty. North American Aviation, Inc. Downey, Calif. Sep 1954. Decl. Nov 1958. 13p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1099

The radiation and thermal stability of ortho-, meta-, and para-terphenyls, by E. L. Colichman and others. North American Aviation, Inc. Downey, Calif. Dec 1954. Decl. Nov 1958. 22p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-1214

Radiation damage studies using the techniques of electron-spin paramagnetic resonance. Period covered: May 1, 1958 through April 30, 1959, by P. J. Bray and A. O. Williams, Jr. Brown Univ. Providence, R. I. Mar 1959. Contract AT(30-1)-2024. 17p. Order from LC. Mi $?.40, ph $3.30. NYO-8532

Correlation of radiation damage with fast flux distribution in the MTR, by W. F. Witzig and M. L. Bleiberg. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Dec 1952. Decl. Apr 1959. 7p. Order from LC. Mi $1.80, ph $1.80. WAPD-P-264

Radioactive Waste

The removal of iodine from gas streams by reaction with silver in packed towers, by R. McNabney and A. M. Lyon. Air Reduction Sales Co. Research Labs., Murray Hill, N. J. Aug 1949. Decl. with deletions Mar 1959. Contract AT-30-2-GEN-2. 49p. Order from LC. Mi $3.30, ph $7.80. ARSC-28(Del.)

Water and supply and drainage quantities for radioactivity laboratories, by John M. Ruddy. Brookhaven National Lab. Upton, N. Y. Jul 1957. 9p. Order from LC. Mi $1.80, ph $1.80. BNL-3283

Proportional sampling of flowing liquid wastes for radioactive monitoring, by John M. Ruddy. Brookhaven National Lab. Upton, N. Y. Apr 1959. Contract AT-30-2-GEN-16. 17p. Order from LC. Mi $2.40, ph $3.30. BNL-4010

Radioactive waste treatment and disposal – a bibliography of unclassified literature, part 2, by J. O. Blomeke. Oak Ridge National Lab. Oak Ridge, Tenn. Jul 1958. Contract W-7405-eng-26. 25p. Order from LC. Mi $2.70, ph $4.80. CF-58-7-77

Removal of fission products from high level radioactive waste solutions, by R. E. Blanco and J. T. Roberts. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-Eng-26. 29p. Order from LC. Mi $2.70, ph $4.80. CF-59-1-32

Reduction of radioactive waste to solids for ultimate storage, by C. W. Hancher. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1959. Contract W-7405-eng-26. 19p. Order from LC. Mi $2.40, ph $3.30. CF-59-1-77

Calculational models of pot calcination, by M. E. Whatley and J. J. Perona. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 10p. Order from LC. Mi $1.80, ph $1.80. CF-59-3-56

The effect of ground-water mounds on the Purex operation, by William H. Bierschenk. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 1957. Contract W-31-109-Eng-52. 18p. Order from LC. Mi $2.40, ph $3.30. HW-49728

Calculation pf Purex A-8 crib capacity, by H. L. Brandt. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jul 1957. Contract W-31-109-Eng-52. 10p. Order from LC. Mi $1.80, ph $1.80. HW-51399

Dilution of 300 area uranium wastes entering the Columbia River, by W. A. Haney. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Sep 1957. Contract 31-109-Eng-52. 15p. Order from LC. Mi $2.40, ph $3.30. HW-52401

Heat transfer in radiant-heat spray calcination, by B. M. Johnson, Jr. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Feb 1959. Contract W-31-109-Eng-52. 22p. Order from LC. Mi $2.70, ph $4.80. HW-58641

The adsorption of ruthenium from nitric acid-air mixtures, by D. A. Hanson and others. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. Jun 1959. Contract AT(10-1)-205. 66p. Order from OTS. $2.00. IDO-14458

Air cleaning studies. Progress report for July 1, 1955 to June 30, 1956, by Richard Dennis and others. Harvard Univ. Air Cleaning Lab., Boston, Mass. Mar 1959. Contract AT(30-1)-841. 43p. Order from LC. Mi $3.30, ph $7.80. NYO-4809

Status report on waste disposal in natural salt formations: II, by F. L. Parker and others. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 56p. Order from LC. Mi $3.60, ph $9.30. ORNL-2700

A study of some factors involved in the disposal of radioactive wastes at sea. Annual progress report, by Richard G. Bader. Texas Agricultural and Mechanical Coll. College Station, Tex. Feb 1957. Contract AT(40-1)-2061. 81p. Order from LC. Mi $4.80, ph $13.80. ORO-185

A study of some factors involved in the disposal of radioactive wastes at sea. Part I. General project information. Part II. Physical oceanography and sedimentology. Part III. Marine bioloby. Part IV. Clay mineralogy. Part V. Physico-chemical considerations. Annual report. Texas Agricultural and Mechanical Coll. College Station, Tex. Feb 1958. Contract AT(40-1)-2061. Pts. I and II, 104p.; Pt. III, 83p.; and Pts. IV and V 60p. Order from LC. Pts. I and II, Mi $5.70, ph $16.80. Pt. III, Mi $4.80, ph $13.80, and Pts. IV and V, Mi $3.60, ph $9.30. ORO-186(Pts. I-V)

The clay mineralogy of the bottom deposits of the west Mississippi Delta area. Technical report no. 1, by R. F. McAllister and others. Texas Agricultural and Mechanical Coll. College Station, Tex. Oct 1958. Project 142. Contract AT(40-1)-2061. 93p. Order from LC. Mi $5.40, ph $15.30. ORO-187

Reactors—General

Studies of reactor containment. Combined monthly progress and financial status report no. 20, by T. A. Zaker. Illinois Inst. of Tech. Armour Research Foundation, Chicago, Ill. Jan 1959. Contract AT(11-1)-528. 6p. Order from LC. Mi $1.80, ph $1.80. AECU-4021

Mechanisms of surface adsorption in homogeneous reactor loops. Semi-annual report no. 1 for period January 1 to June 30, 1957, by H. J. Eding and E. M. Kinderman. For Oak Ridge National Lab. Stanford Research Inst. Menlo Park, Calif. Sep 1957. Contract W-7405-eng-26, subcontract 1081. 22p. Order from LC. Mi $2.70, ph $4.80. AECU-4048

Ignition behavior and kinetics of oxidation of the reactor metals, uranium, zirconium, plutonium and thorium, and binary alloys of each. A status report, by J. G. Schnizlein and others. Argonne National Lab. Lemont, Ill. Apr 1959. Contract W-31-109-eng-38. 206p. Order from OTS. $3.50. ANL-5974

Study of 40 Mw pressurized water, boiling water, and organic moderated reactors for production of process steam, by L. E. Link and others. Argonne National Lab. Lemont, Ill. Jun 1959. Contract W-31-109-eng-38. 140p. Order from OTS. $2.75. ANL-6009

Measurement of neutron flux in the EBR, by P. J. Persiani and G. R. Ringo. Argonne National Lab. Lemont, Ill. May 1952. 8p. Order from LC. Mi $1.80, ph $1.80. ANL-LAT-86

Nuclear excursion analysis on the IBM 650 (early code), by Clifford J. Stueck and Earl M. Reiback. Alco Products, Inc. Schenectady, N. Y. Feb 1959. Contract AT(30-3)-326. 15p. Order from LC. Mi $2.40, ph $3.30. APAE-Memo-177

Thermal bowing of core subassemblies. Atomic Power Development Associates, Inc. Detroit, Mich. Feb 1959. 41p. Order from LC. Mi $3.00, ph $6.30. APDA-128

Fast-period reactor safety fuse tests, by S. N. Stilwell and R. L. Waterfield. General Electric Co. Atomic Products Div., Aircraft Nuclear Propulsion Dept., Cincinnati, Ohio. Jun 1957. Contracts AF33(600)-38062 and AT(11-1)-171. 76p. Order from OTS. $2.25. APEX-492

Liquid metal fuel reactor experiment; preliminary hazards evaluation for the use of sodium in the BNL four-inch loop. Babcock and Wilcox Co. Atomic Energy Div., Lynchburg, Va. Oct 1957. Contract AT(30-1)-1940. 10p. Order from LC. Mi $2.40, ph $3.30. BAW-1030

Stored energy: growth and annealing status of graphite moderator in the BNL research reactor. Final report. Brookhaven National Lab. Upton, N. Y. Contains reports BNL-275 (Del.) and BNL-255. 225p. Order from LC. Mi $3.90, ph $34.80. BNL-4124

The elastic response to internal blast loading of models of outer containment structures for nuclear reactors, by J. W. Hanna and others. Ballistic Research Laboratories. Aberdeen Proving Ground, Md. Feb 1959. Report no. 1067. Army project no. 503-04-002 and Ordnance research and development project no. TB3-0112. 50p. Order from OTS. $1.75. BRL-1067

MSPR in-pile loop ORNL-MTR-44 design and operating conditions, by J. A. Conlin. Oak Ridge National Lab. Oak Ridge, Tenn. Oct 1958. Contract W-7405-eng-26. 41p. Order from LC. Mi $3.30, ph $7.80. CF-58-10-64

Preliminary report on heat generation and stresses in the wall of a spherical HRE-4 pressure vessel, by R. D. Cheverton. Oak Ridge National Lab. Oak Ridge, Tenn. Dec 1958. Contract W-7405-eng-26. 18p. Order from LC. Mi $2.40, ph $3.30. CF-58-11-1

Reactivity changes associated with slurry settling in small slurry reactors, by C. W. Nestor, Jr. and M. W. Rosenthal. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-59-2-10

Critical concentrations for HRT-type reactors subjected to various conditions, by Roger Chalkley. Oak Ridge National Lab., Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 3p. Order from LC. Mi $1.80, ph $1.80. CF-59-2-25

The nuclear fuel cycle: prospects for reducing its cost, by W. L. Albrecht. Oak Ridge National Lab. Oak Ridge, Tenn. Feb 1959. Contract W-7405-eng-26. 15p. Order from LC. Mi $2.40, ph $3.30. CF-59-2-57

The effect of moderator temperature on maximum attainable exposure in plutonium recycle operation, by J. L. Carter. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Aug 1957. Contract W-31-109-Eng-52. 23p. Order from LC. Mi $2.70, ph $4.80. HW-51957-RD

Start-up of a carbon steel loop, by E. L. Burley. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jul 1958. Contract W-31-109-Eng-52. 16p. Order from LC. Mi $2.40, ph $3.30. HW-56912

Reactivity worth and power distribution of spike loading configurations in PRTR, by R. E. Peterson and J. J. Regimbal. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Oct 1958. 23p. Order from LC. Mi $2.70, ph $4.80. HW-58016

Flow decay after an electrical power out-age in the PRTR, by J. Muraoka. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Feb 1959. Contract W-31-109-Eng-52. 5p. Order from LC. Mi $1.80, ph $1.80. HW-59014(Rev.)

Effect of moderator height on reactivity and vertical flux distribution in PRTR, by J. J. Regimbal. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Mar 1959. Contract W-31-109-Eng-52. 17p. Order from LC. Mi $2.70, ph $4.80. HW-59373

Division of reactor development programs monthly report for February 1959, by L. H. McEwen,

comp. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Mar 1959. Contract W-31-109-Eng-52. 32p. Order from LC. Mi $3.00, ph $6.30. HW-59600

Quarterly progress report for July, August, September, 1958, by G. O. Bright. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. May 1959. Contract AT(10-1)-205. 72p. Order from OTS. $2.00. IDO-16512

Hydraulics of ETR-MTR capsule experiments. Supplement to IDO-16368, by R. G. Beck. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. May 1959. Contract AT(10-1)-205. 44p. Order from OTS. $1.25. IDO-16516

Spent fuel element activity and core burnup distribution from the MTR plutonium core loading, by J. M. Waage. Phillips Petroleum Co. Atomic Energy Div., Idaho Operations Office, Idaho Falls, Idaho. Jun 1959. Contract AT (10-1)-205. 22p. Order from OTS. 75 cents. IDO-16524

WBNS critical experiment, by T. Fahrner. North American Aviation, Inc. Downey, Calif. Mar 1952. Decl. Feb 1959. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-256

Kinetics of a pool-type reactor with stainless steel fuel plates, by D. L. Hetrick. North American Aviation, Inc. Downey, Calif. Mar 1955. Decl. Nov 1958. 20p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1276

The torque tube test, by D. L. Whitlock. North American Aviation, Inc. Downey, Calif. Sep 1955. 10p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1460

Calculation of the reactivity effect of control rod movement in the Enrico Fermi reactor, by J. H. Ray. Nuclear Development Corp. of America. White Plains, N. Y. Oct 1957. 19p. Order from LC. Mi $2.40, ph $3.30. NDA-014-189

A pulsed subcritical uranium assembly for educational uses. Progress report no. 4 for the period July 1 to December 31, 1958. Rensselaer Polytechnic Inst. Troy, N. Y. 1958. Contract AT(30-1)-294. 50p. Order from LC. Mi $3.60, ph $9.30. NYO-2608

The applicability of experimental design to the reactor safety program, by Thomas E. Cheatham, Jr. and Miller N. Hudson. Technical Operations, Inc. Arlington, Mass. Dec 1956. Contract AT(30-1)-1889. (TOW-56-4). 46p. Order from LC. Mi $3.30, ph $7.80. NYO-4721

A stochastic model of reactor operations, by J. B. Friedman and R. A. Langevin. Technical Operations, Inc. Arlington, Mass. Dec 1956. Contract AT(30-1)-1889. (TOW-56-8). 26p. Order from LC. Mi $2.70, ph $4.80. NYO-4723

Initial shutoff in a reactor transient, by Eric T. Clarke. Technical Operations, Inc. Arlington, Mass. Dec 1956. Contract AT(30-1)-1889. (TOI-56-32). 37p. Order from LC. Mi $3.00, ph $6.30. NYO-4726

Initial post neutron measurements in the ORR, by C. D. Cagle and R. A. Costner, Jr. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 56p. Order from OTS. $1.75. ORNL-2559

Nucleate-boiling studies with aqueous ThO_2 slurries, by D. G. Thomas and others. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 21p. Order from OTS. 75 cents. ORNL-2722

Treatment of control rods in reactor calculations, by Stanley Stein. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Mar 1955. 3p. Order from LC. Mi $1.80, ph $1.80. WAPD-P-643

Reproducibility of measurements in the reactivity measurement facility, by S. B. Gunst. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Aug 1958. 13p. Order from LC. Mi $2.40, ph $3.30. WAPD-PWR-Ph-351

Reactors—Power

Initial start-up and low power operation special procedure. Section I. Test results DL-S-161 (T-550127). Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 9p. Order from LC. Mi $1.80, ph $1.80. AECU-4002

Reactor coolant loop outage test. Section I. Second performance. Test results DL-S-170 (T-554928-A). Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 13p. Order from LC. Mi $2.40, ph $3.30. AECU-4003

Governor performance tests. Section IV. Second performance. Test results DL-S-174. Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 5p. Order from LC. Mi $1.80, ph $1.80. AECU-4004

Flow distribution across the core. Section II. Test results DL-S-182 (T-550097). Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 12p. Order from LC. Mi $2.40, ph $3.30. AECU-4005

Monthly operating report for December 1958. Duquesne Light Co. Shippingport, Pa. 1958. Contract AT(11-1)-222. 47p. Order from LC. Mi $3.30, ph $7.80. AECU-4015

Determination of the chemical characteristic of the 1C boiler. Section III. Test results DL-S-209. Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 34p. Order from LC. Mi $3.00, ph $6.30. AECU-4026

Reactor automatic control and load swing tests. Section I. Test results DL-S-164 (T-554924). Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 110p. Order from LC. Mi $6.00, ph $18.30. AECU-4027

Station start-up test. Section I. Test results DL-S-163 (T-554923). Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 15p. Order from LC. Mi $2.40, ph $3.30. AECU-4028

Rod drop transient. Section I. Test results DL-S-247 (T-641323). Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 22p. Order from LC. Mi $2.70, ph $4.80. AECU-4029

Determination of coefficients of reactivity. Section I-560 EFPH. Fourth performance. Test results DL-S-151 (T-550132). Duquesne Light Co. Shippingport, Pa. First issue, Jan 1959. 59p. Order from LC. Mi $3.60, ph $9.30. AECU-4030

Control rod positions for criticality. Section I. Third performance. Test results DL-S-149 (T-550130). Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 14p. Order from LC. Mi $1.80, ph $1.80. AECU-4031

Rod drop transient test. Section II. Test results DL-S-247(T-641323). Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 22p. Order from LC. Mi $2.70, ph $4.80. AECU-4046

Heat transfer from spent fuel and blanket subassemblies during transfer from reactor to decay storage facility. Technical memorandum no. 2, by L. L. Kintner. Atomic Power Development Associates, Inc. Detroit, Mich. May 1957. Contract AT(11-1)-476. 60p. Order from LC. Mi $3.60, ph $9.30. AECU-4058

Fission gases in molten fuel fast reactors. Technical memorandum no. 4, by Evan C. Kovacic. Atomic Power Development Associates, Inc. Detroit, Mich. Jul 1957. Contract AT(11-1)-476. 6p. Order from LC. Mi $1.80, ph $1.80. AECU-4060

Some nuclear considerations in fuel reloading and control. Technical memorandum no. 8, by E. I. Alexanderson. Atomic Power Development Associates, Inc. Detroit, Mich. Aug 1957. Contract AT(11-1)-476. 15p. Order from LC. Mi $2.40, ph $3.30. AECU-4061

Survey of the radiation levels in the containment vessel of the Enrico Fermi Atomic Power Plant. Part I. Gamma radiation levels in the equipment compartment due to primary sodium activity and associated fission product contamination. Technical memorandum no. 16, by W. F. Chaltron and H. E. Hungerford. Atomic Products Development Associates, Inc. Detroit, Mich. Sep 1958. Contract AT(11-1)-476. 51p. Order from LC. Mi $3.60, ph $9.30. AECU-4063

Design basis for the fuel handling and decay storage facility. Technical memorandum no. 18, by W. W. Kendall and others. Atomic Power Development Associates, Inc. Detroit, Mich. Nov 1958. Contract AT(11-1)-476. 37p. Order from LC. Mi $3.00, ph $6.30. AECU-4064

Station output. Section I. Test results DL-S-210. (T-612387). Duquesne Light Co. Shippingport, Pa. First issue, Feb 1959. 16p. Order from LC. Mi $2.40, ph $3.30. AECU-4073

The Armour dust fueled reactor (ADFR). Final report covering the period February 21, 1958 to February 21, 1959, by D. Krucoff. Illinois Inst. of Tech. Armour Research Foundation, Chicago, Ill. 1959. ARF project A-115. Contract AT(11-1)-603. 69p. Order from LC. Mi $3.90, ph $10.80. AECU-4075

Reactivity lifetime. Section I. Second performance. Test results DL-S-225 (T-612118A). Duquesne Light Co. Shippingport, Pa. First issue, Mar 1959. 172p. Order from LC. Mi $8.10, ph $27.30. AECU-4078

Periodic radiation survey. Section II. First performance. Test results DL-S-231 (T-612394). Duquesne Light Co. Shippingport, Pa. First issue, Mar 1959. 14p. Order from LC. Mi $2.40, ph $3.30. AECU-4079

Dynamic behavior of boiling reactors, by J. A. Thie. Argonne National Lab. Lemont, Ill. May 1959. ContractW-31-109-eng-38. 51p. Order from OTS. $1.50. ANL-5849

The kinetics and stability of fast reactors with special considerations of nonlinearities (thesis), by Henry A. Sandmeier. Argonne National Lab. Lemont, Ill. Jun 1959. Contract W-31-109-eng-38. 83p. Order from OTS. $2.25. ANL-6014

APPR-1 research and development program decontamination and decontamination in nuclear power reactors, by John L. Zegger and Guyen P. Pancer. Alco Products, Inc. Schenectady, N. Y. Feb 1959. Contract AT(30-3)-326. 73p. Order from LC. Mi $3.60, ph $9.30. APAE-43(Vol. I)

APPR-1 research and development program decontamination program. Task II. Volume II. Evaluation of chemical agents for nuclear reactor decontamination, by John L. Zegger and Guyon P. Pancer. Alco Products, Inc. Schenectady, N. Y. Feb 1959. Contract AT(30-3)-326. 204p. Order from LC. Mi $7.20, ph $22.80. APAE-43(Vol. II)

APPR-1 research and development program decontamination program. Task II. Volume III. Recommended procedure for decontamination of a stainless steel steam generator, by Guyon P. Pancer and John L. Zegger. Alco Products, Inc. Schenectady, N. Y. Feb 1959. Contract AT(30-3)-326. 25p. Order from LC. Mi $2.70, ph $4.80. APAE-43(Vol. III)

Short-lived and fission product activity in the SM-1 primary coolant. Final report. Task III, by William S. Brown and Robert A. Haas. Alco Products, Inc. Schenectady, N. Y. Mar 1959. Contract AT(30-3)-326. 97p. Order from LC. Mi $4.50, ph $12.30. APAE-44

SM-1 (formerly APPR-1) research and development program; interim report on core measurements. Task no. VII, by S. D. MacKay and others. Alco Products, Inc. Schenectady, N. Y. Mar 1959. Contract AT(30-3)-326. 88p. Order from LC. Mi $3.60, ph $9.30. APAE-Memo-178

Enrico Fermi Atomic Power Plant. Atomic Power Development Associates, Inc. Detroit, Mich. Jan 1959. 232p. Order from OTS. $3.50. APDA-124

Nuclear merchant ship reactor project technical progress report for the period April 1, 1957-October 1, 1957. Babcock and Wilcox Co. Atomic Energy Div., Lynchburg, Va. 1957. Contract AT(30-3)-274. 65p. Order from LC. Mi$4.50, ph $12.30. BAW-1038

Nuclear merchant ship reactor project quarterly technical report for October-December 1957. Babcock and Wilcox Co. Atomic Energy Div., Lynchburg, Va. 1957. Contract AT(30-3)-274. 81p. Order from LC. Mi $4.80, ph $13.80. BAW-1042(Rev.)

Liquid metal fuel reactor experiment. Calibration tests of a permanent-magnet electromagnetic flowmeter for liquid bismuth service, by L. W. Yoder and B. L. Birch. The Babcock & Wilcox Co. Atomic Energy Div., Lynchburg, Va. Mar 1959. Contracts AT(30-1)-1940 and AEJ-46. 30p. Order from OTS. $1.00. BAW-1070

Liquid metal fuel reactor experiment. A gas-shielded consumable-electrode arc welding process for butt welding Croloy 2-1/4 piping, by R. M. Hargrove. The Babcock & Wilcox Co. Atomic Energy Div., Lynchburg, Va. Mar 1959. Contracts AT(30-1)-1940 and AEJ-46. 39p. Order from OTS. $1.25. BAW-1072

Liquid metal fuel reactor. Research and development program. The Babcock & Wilcox Co. Atomic Energy Div., Lynchburg, Va. Jun 1958. Contracts AT(30-1)-1940 and AEJ-46. 109p. Order from OTS. $2.50. BAW-1104

The effects of fission product leakage of the NMSR plant, by D. W. Montgomery. Babcock and Wilcox Co. Atomic Energy Div., Lynchburg, Va. May 1958. Contract AT(30-3)-274. 66p. Order from LC. Mi $4.50, ph $12.30. BAW-1110

Cobalt activity buildup in the nuclear merchant ship reactor, by J. L. Meem. For Babcock & Wilcox Co. Atomic Energy Div. Univ. of Virginia. Charlottesville, Va. Oct 1958. 24p. Order from LC. Mi $2.70, ph $4.80. BAW-1130

Hazards summary report for the reflector-control critical-assembly experiments, by Francis J. Jankowski and others. Battelle Memorial Inst. Columbus, Ohio. Feb 1957. Decl. Feb 1959. 80p. Order from LC. Mi $4.50, ph $12.30. BMI-1166

Critical-assembly experiments on a reflector control system for a boiling reactor, by David A. Dingee and others. Battelle Memorial Inst. Columbus, Ohio. Dec 1957. Contract W-7405-eng-92. 50p. Order from LC. Mi $3.30, ph $7.80. BMI-1245

PWR core 2 model studies to improve inlet-plenum-chamber mixing, by Lawrence J. Flanigan and others. Battelle Memorial Inst. Columbus, Ohio. May 1959. Contract W-7405-eng-92. 69p. Order from OTS. $2.00. BMI-1342

The liquid metal fuel reactor for central station power, by Donald J. Sengstaken and Edwin Durham. Brookhave National Lab. Upton, N. Y. 1955. 36p. Order from LC. Mi $3.00, ph $6.30. BNL-2463

Preliminary process design of power plant, by T. V. Moore and M. C. Leverett. Univ. of Chicago. Metallurgical Lab., Chicago, Ill. Sep 1942. Decl. Feb 1957. Contract W-7401-eng-37. (A-303). 68p. Order from LC. Mi $3.90, ph $10.80. CE-227

Derivation of the thermal kinetic equations for the package reactor, by J. C. Gallagher and M. L. Winton. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1955. Decl. Sep 1958. Contract W-7405-eng-26. 18p. Order from LC. Mi $2.40, ph $3.30. CF-55-4-53

HRP-CP: an evaluation of the design features of blanket processing loop P-1, by J. W. Snider and S. D. Clinton. Oak Ridge National Lab. Oak Ridge, Tenn. Oct 1958. Contract W-7405-eng-26. 41p. Order from LC. Mi $3.30, ph $7.80. CF-58-10-114

Requirements for raw materials in an expanding nuclear power economy, by E. D. Arnold and J. W. Ullmann. Oak Ridge National Lab. Oak Ridge, Tenn. Jan 1959. Contract W-7405-eng-26. 39p. Order from LC. Mi $3.00, ph $6.30. CF-59-1-60

Temperature structure in the gas cooled reactor fuel elements using a scalloped coolant channel, by L. G. Epel. Oak Ridge National Lab. Oak Ridge, Tenn. Mar 1959. Contract W-7405-eng-26. 11p. Order from LC. Mi $2.40, ph $3.30. CF-59-3-39

The economics of nuclear power, by James A. Lane. Oak Ridge National Lab. Oak Ridge, Tenn. Apr 1959. Contract W-7405-eng-26. 30p. Order from LC. Mi $2.70, ph $4.80. CF-59-4-86

Some resuks ot tests and observations of the S3G feedwater control systems, by J. E. Barnes, Jr. and others. Knolls Atomic Power Lab. Schenectady, N. Y. Apr 1959. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $3.00, ph $6.30. KAPL-M-JRB-8

Neutron flux and fuel distribution measurements; system design description, by J. C. Childs. Knolls Atomic Power Lab. Schenectady, N. Y. May 1957. Contract W-31-109-Eng-52. 43p. Order from LC. Mi $3.30, ph $7.80. KAPL-M-SSD-37(Rev. 1)

Organic moderated reactor experiment quarterly progress report for April-June 1957, by C. A. Trilling. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Dec 1958. Contract AT(11-1)-GEN-8. 46p. Order from OTS. $1.25. NAA-SR-2399

Development of a fuel handling system for an organic moderated reactor, by J. A. Leppard. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Apr 1959. Contract AT (11-1)-GEN-8. 35p. Order from OTS. $1.00. NAA-SR-2952

Radiation effects resulting from fuel cladding failure in the 45.5 Mw (thermal) organic moderated reactor, by M. Dunenfeld. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT (11-1)-GEN-8. 24p. Order from OTS. 75 cents. NAA-SR-3151

Low-power physics experiments on the sodium reactor experiment, by R. W. Campbell. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT (11-1)-GEN-8. 46p. Order from OTS. $1.50. NAA-SR-3341

First sodium reactor experiment (SRE) test of hallam nuclear power facility (HNPF) control materials, by S. O. Arneson. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT(11-1)-GEN-8. 31p. Order from OTS. $1.00. NAA-SR-3467

Development of the SRE Mark II safety rod, by E. C. Phillips and R. G. Hoff. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT(11-1)-GEN-8. 23p. Order from OTS. 75 cents. NAA-SR-3482

Two-group SRE fluxes in two dimensions, by A. R. Vernon. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Jun 1959. Contract AT(11-1)-GEN-8. 18p. Order from OTS. 50 cents. NAA-SR-3515

SRE fuel rod drop tests, by W. J. Hallett and C. H. Robbins. North American Aviation, Inc. Downey, Calif. May 1954. Decl. Nov 1958. 20p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-988

A fluid-fuel, solid-fertile material assembly design for SGR, by R. Balent. North American Aviation, Inc. Downey, Calif. May 1954. Decl. Mar 1959. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1008

Exponential experiments proposed for the determination of the nuclear parameters of sodium-graphite lattices, by R. A. Laubenstein. North American Aviation, Inc. Downey, Calif. Aug 1954. Decl. Apr 1959. 6p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-1077

SRE criticality calculations, by R. O. Williams, Jr. North American Aviation, Inc. Downey, Calif. Oct 1954. Decl. Nov 1958. 18p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1082

SRE control rod studies and related subjects, by F. L. Fillmore. North American Aviation, Inc. Downey, Calif. Jan 1955. Decl. Nov 1958. 30p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-1234

Thermal stresses in long thin-walled cyclinders due to an axial temperature gradient, by C. H. Robbins. North American Aviation, Inc. Downey, Calif. Jul 1955. 11p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1438

Calibration of SRE type orifice plates, by C. R. Davidson. North American Aviation, Inc. Downey, Calif. Mar 1956. 26p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-1584

Heat transfer analysis of 19-rod fuel element in handling cask, by H. L. Sletten. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Oct 1956. 40p. Order from LC. Mi $3.00, ph $6.30. NAA-SR-Memo-1745

Performance of the SRE prototype cold trap assembly, by M. E. Nathan. North American Aviation, Inc. Atomics International, Canoga Park, Calif. Dec 1956. 29p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-1798

Reactivity studies on natural uranium-D_2O lattices (calculation methods survey and experimental results), by W. L. Brooks and others. Nuclear Development Corp. of America. White Plains, N. Y. Mar 1959. Contract AT(30-3)-256. 46p. Order from LC. Mi $3.30, ph $7.80. NDA-84-17

Effect of plutonium buildup on temperature coefficient, by W. L. Brooks and H. Sodak. For Yankee Atomic Electric Co. Nuclear Development Corp. of America. White Plains, N. Y. Apr 1958. 29p. Order from LC. Mi $2.70, ph $4.80. NDA-2072-1

Operation of the aircraft reactor experiment, by W. B. Cottrell and others. Oak Ridge National Lab. Oak Ridge, Tenn. Sep 1955. Contract W-7405-Eng-26. 238p. Order from OTS. $3.50. ORNL-1845(Del.)

Gas-cooled reactor coolant choice. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 23p. Order from OTS. $1.00. ORNL-2699

Molten-salt reactor project quarterly progress report for period ending April 30, 1959, by H. G. MacPherson. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 105p. Order from OTS. $2.50. ORNL-2723

Pressurized water reactors. A literature search, by Sidney F. Lanier. United States Atomic Energy Commission. Technical Information Service, Oak Ridge, Tenn. Jun 1959. 33p. Order from OTS. $1.00. TID-3530

Process specification for compaction of natural UO_2 fuel components for PWR core I blanket fuel rods. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Mar 1957. Decl. Feb 1959. (AP-292531). 7p. Order from LC. Mi $1.80, ph $1.80. TID-5418

20,000 KW nuclear power plant study for United States Atomic Energy Commission. Gilbert Associates, Inc. Washington, D. C. Jun 1957. Decl. Nov 1957. Contract AT(11-1)-467. 226p. Order from OTS. $3.00. TID-5469

Shippingport Atomic Power Station Manual. Volume II. 1958. System description no. 35: PWR reactor plant overall control system design description. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Mar 1954. Decl. Mar 1957. (WAPD-B(C)-1390). 13p. Order from LC. Mi $2.40, ph $3.30.
TID-7020 Vol. II Syst. 35

PWR failed element detection and location system, by H. H. Vogel. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Aug 1957. 3p. Order from LC. Mi $1.80, ph $1.80.
WAPD-CDA-(I)-7

Considerations for the design criteria of the PWR waste disposal system. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh, Pa. Dec 1954. Decl. Oct 1958. Contract AT-11-1-GEN-14. 10p. Order from LC. Mi $1.80, ph $1.80. WAPD-PA-64

The WAPD-SPERT-1 experiment, by E. R. Sanford. Westinghouse Electric Corp. Bettis Plant, Pittsburgh, Pa. Jul 1956. 49p. Order from LC. Mi $3.30, ph $7.80. WAPD-S5W-RP-49

Stochastic fluctuations in a power reactor, by D. R. Harris. Westinghouse Electric Corp. Bettis Atomic Power Div., Bettis Plant, Pittsburgh, Pa. Nov 1958. Contract AT-11-GEN-14. 39p. Order from OTS. $1.25.
WAPD-TM-190

A study of the temperature and pressure in the reactor and the drain tanks of the par during an emergency drain, by D. F. Rinald. Westinghouse Electric Corp. Atomic Power Dept. Pittsburgh, Pa. and Pennsylvania Power and Light Co. Pittsburgh, Pa. Jun 1957. 14p. Order from LC. Mi $2.40, ph $3.30. WCAP-571

Carolinas Virginia nuclear power associates CVTR project monthly progress report for January 16, 1959 to February 16, 1959. Westinghouse Electric Corp. Atomic Power Dept., Pittsburgh, Pa. 1959. 19p. Order from LC. Mi $2.40, ph $3.30. WCAP-1096

Carolinas Virginia nuclear power associates CVTR project. Progress report for February 17, 1959 to March 31, 1959. Westinghouse Electric Corp. Atomic Power Dept., Pittsburgh, Pa. 1959. 23p. Order from LC. Mi $2.70, ph $4.80. WCAP-1148

DARED-1-an IBM-704 program for reducing data from foil irradiation and fitting by least squares to Bessel J_0 or cosine function, by Jack Jedruch and Carl Sallbach. For Yankee Atomic Electric Co. Westinghouse Electric Corp. Atomic Power Dept., Pittsburgh, Pa. Jan 1959. Contract AT(30-2)-222, subcontract no. 1. 116p. Order from LC. Mi $6.00, ph $18.30.
YAEC-104

Monthly progress report for the period January 1 to 31, 1959, by R. W. Garbe and H. E. Walchli. For Yankee Atomic Electric Co. Westinghouse Electric Corp. Atomic Power Dept., Pittsburgh, Pa. Feb 1959. Contract AT(30-3)-222, subcontract no. 1. 16p. Order from LC. Mi $2.40, ph $3.30. YAEC-119

Monthly progress report for the period February 1 to 28, 1959, by H. E. Walchli. For Yankee Atomic Electric Co. Westinghouse Electric Corp. Atomic Power Dept., Pittsburgh, Pa. Mar 1959. Contract AT(30-3)-222, subcontract no. 1. 14p. Order from LC. Mi $2.40, ph $3.30. YAEC-121

Stable Isotope Separation

Mevac exploratory experiments, by G. A. Kulpers and D. B. Trauger. Oak Ridge Gaseous Diffusion Plant. Oak Ridge, Tenn. Jun 1954. Decl. with deletions Jan 1957. Contract W-7405-eng-26. 29p. Order from LC. Mi $2.70, ph $4.80. K-1111(Del.)

First Mevac pilot plant, by G. A. Kuipers and D. B. Trauger. Oak Ridge Gaseous Diffusion Plant. Oak Ridge, Tenn. Jan 1957. Contract W-7405-eng-26. 40p. Order from LC. Mi $3.00, ph $6.30. K-1112(Del.)

Separation of lithium isotopes by molecular distillation: second Mevac pilot plant, by J. J. Keyes, Jr. and others. Oak Ridge Gaseous Diffusion Plant. Oak Ridge, Tenn. Jun 1955. Decl. with deletions Jan 1957. Contract W-7405-eng-26. 49p. Order from LC. Mi $3.30, ph $7.80. K-1220(Del.)

Technology—Feed Materials

Process development quarterly report. Part I - laboratory work, by J. U. Shepardson and J. A. Nelson. Mallinckrodt Chemical Works. St Louis, Missouri. Jul 1959. 107p. Order from OTS. $2.50. MCW-1430

Processing of the commission blend of Colorado front range uranium ores (AEC-455.24), by I. L. Nichols and others. Bureau of Mines. Intermountain Experiment Station, Salt Lake City, Utah. Feb 1959. (RR-53.2). 53p. Order from LC. Mi $3.60, ph $9.30. AECU-4041

Processing of the Cotter Blend of Colorado front range uranium ores (AEC-455.25), by I. L. Nichols and others. Bureau of Mines. Intermountain Experiment Station, Salt Lake City, Utah. Feb 1959. (RR-53.3). 19p. Order from LC. Mi $2.40, ph $3.30. AECU-4047

Uranium extraction by TRI-n-octylamine sulfate, by Kenneth A. Allen. Oak Ridge National Lab. Oak Ridge, Tenn. N.D. Contract W-7405-eng-26. 23p. Order from OTS. 75 cents. ORNL-2709

Acid leach-CCD-solvent Extraction Pilot Plant testing of Holly Minerals Company ore, by Merle A. Peters and Ralph L. Shimmin. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Jun 1958. Contract AT(49-6)-924. 68p. Order from LC. Mi $3.90, ph $10.80. WIN-109

Second interim report on investigations into the problem of radioactive pollution of uranium mill effluents, by M. A. DeSesa, com. and ed. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Apr 1959. Contract AT(49-6)-924. 76p. Order from LC. Mi $4.50, ph $12.30. WIN-111